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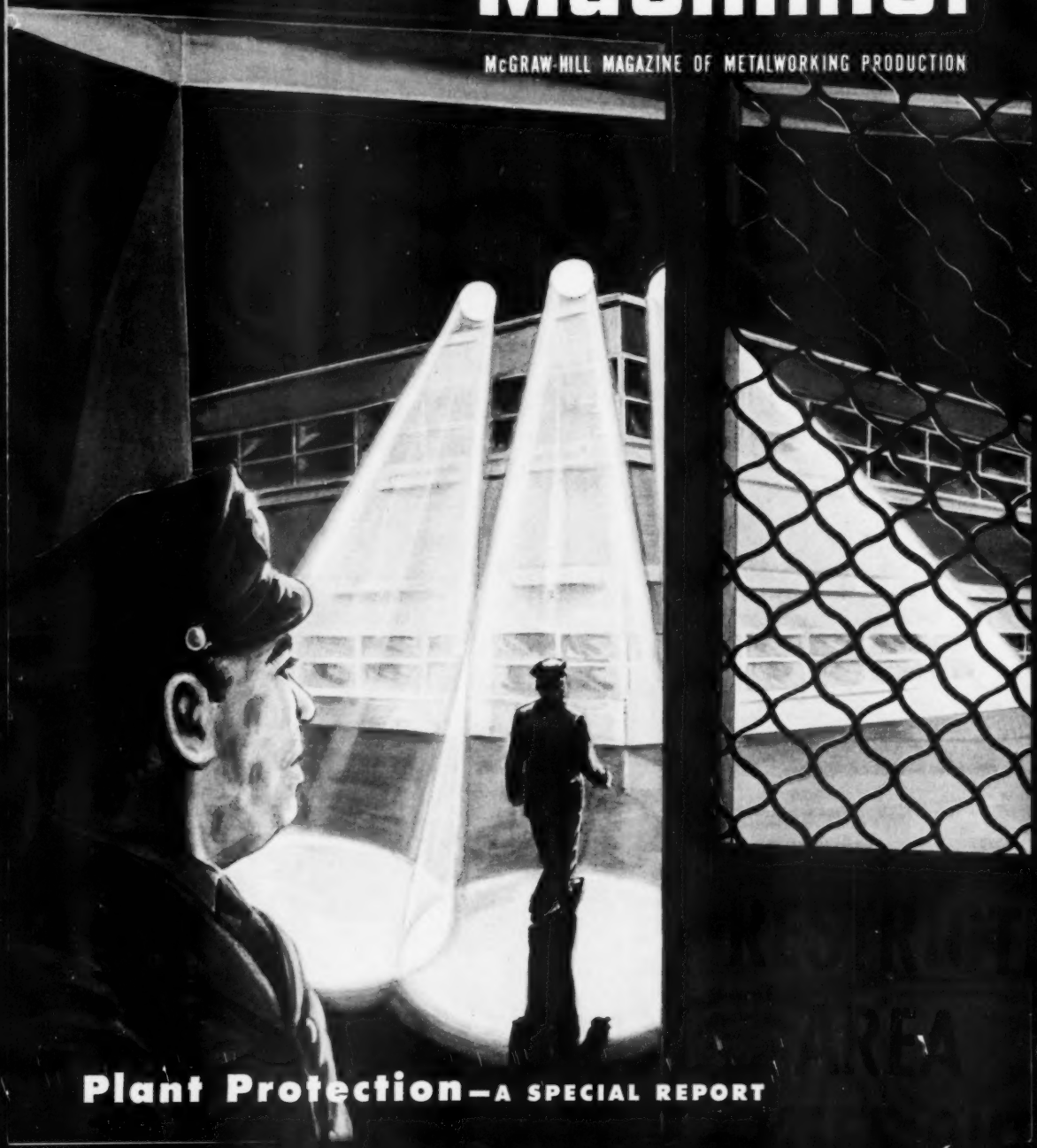
JULY 23, 1951

American Machinist

McGRAW-HILL MAGAZINE OF METALWORKING PRODUCTION



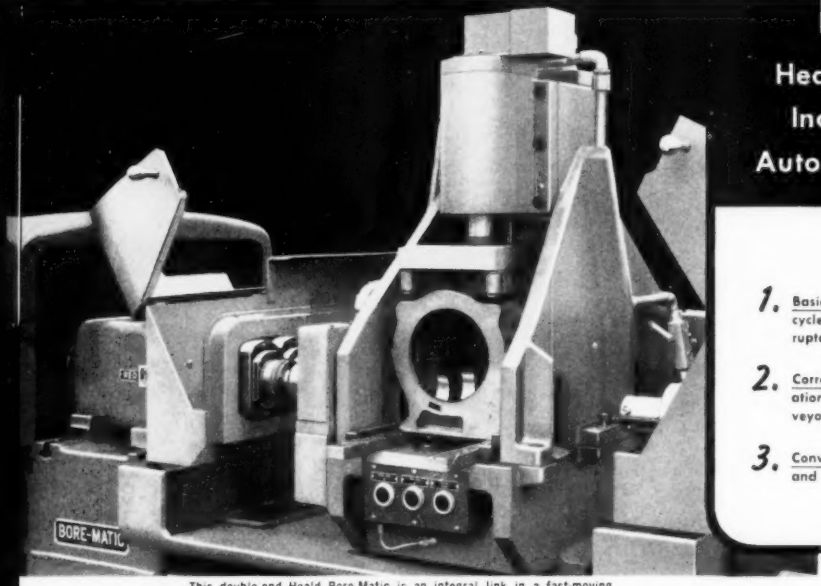
Plant Protection—A SPECIAL REPORT

When production lines shift to defense, the PROVED DEPENDABILITY of Heald machines helps to KEEP 'EM ROLLING

There's no room for weak links in the chain of operations that makes up your production line — especially when you're tooling up for vital defense orders. That's where Heald's extra dependability and proved precision can help you off to a good start — and keep production rolling around the clock.

The new Heald Bore-Matics and grinding machines have won their service stripes in the most competitive fields of highly mechanized production — setting enviable records for speed, efficiency and dependability. This background of proved performance — plus Heald's unequalled engineering experience in all fields of precision finishing — can smooth the way for faster, easier conversion, and *sustained production* that will meet the most exacting requirements.

Remember — when it comes to precision finishing, it pays to come to Heald.



This double-end Heald Bore-Matic is an integral link in a fast-moving automotive conveyor line, borizing cross holes in transmission housings.

Heald Bore-Matic Setup Increases Efficiency of Automotive Conveyor Line

HERE'S WHY

1. Basic Dependability — sound design and reliable cycle functions provide the maximum in uninterrupted production.
2. Correct Working Height — combines ease of operation and loading with required level for conveyor setup.
3. Convenient Operation — automatic operating cycle and fixture equipment controlled by push buttons.

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Chips and QUIPS

Protection . . . Our current cover is reproduced from a special watercolor made by our assistant art director, "Dick" Rooman, who also painted our Metalworking Santa Claus last Dec. 25. This cover, however, illustrates a somewhat different sentiment—that of plant protection. Conceived as a companion piece to "Disaster Control" (*AM*, Nov. 13, 1950), it provides essential know-how on guarding, protective lighting, identification, and fencing a Metalworking plant. Details of protective techniques are closely guarded secrets in these parlous times, but Asst. Editor Emerson has managed to put together a number of general suggestions and some very specific points. These are not all the things you can do to protect a plant, but they're key items.

Incidentally, the cover shows spotlights, because they're more pictorial, but floodlights would, in most cases, be more practical in the gate area.

Tricky Holes . . . Small drills going in fairly deep spell trouble—unless you know how. MB Mfg Co. has been drilling four holes at once in engine mount brackets—within 0.003-in. tolerance and to 3 to 5 mu-in. rms finish—by switching to gun drills . . . More on drilling comes from Motorola, Inc., where they've developed an air vise with automatic stops and a drill for two holes at right angles.

Safe Pressing . . . Federico Strasser writes from Chile on various ways of feeding presses, pointing out advantages and danger spots that lead to accidents. Then he explains some European die types that the operator cannot get a hand into.

Recesser . . . John R. Nick has worked out in detail how to make a first-class recessing tool for small holes. His instructions make a useful Reference Book Sheet in this issue. He is a graduate of Brooklyn Technical High School, worked in job-shops around Manhattan summers, has since had two years with N. Y. Board of Education maintenance, 12 years with Ford Instrument.

Fat Cats . . . A. M. Elliott, who wrote "So You Can't Hire Young Executives" that you liked so well, is back again. This time he lets go a blast at the fat cats who steal all the good ideas of their subordinates and "forget" to give credit where it's due.

Ideas . . . Robert G. Planck, toolroom foreman at Regal Tool & Mfg Co., put together for us some notes on choosing and checking diesets, on clearance in dies, on mounting-punch and die details, fitting dowel pins, and similar ideas. And like ideas will, it burgeoned from an expected two pages to three. So we switched things around—a frequent need on a fortnightly magazine. We try to keep 'em short to save your time—but not too short.

Low-Cost Jigs . . . A quick and easy way to make simple drill jigs from ordinary shop materials when toolmakers aren't available and precision isn't *too* vital . . . that's a frequent need in the job shop. Frank Biechele of Serge Elevator Co. gives some of the answers.

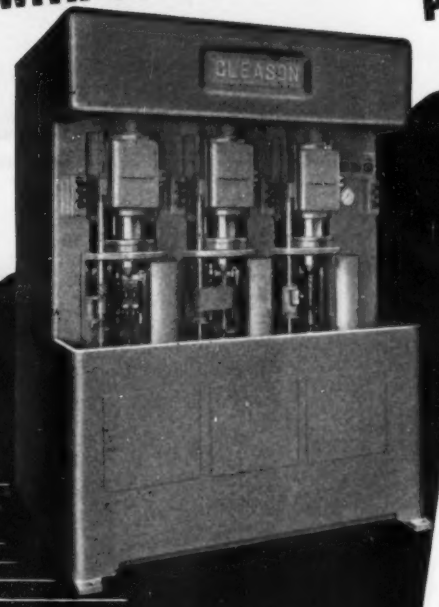
How Much for Defense? . . . One answer to that question is "$10 per employee". We've had many questions about the cost since publication of "Disaster Control" last Nov. 1, so have put together a "$10 package", showing what is required and estimating the cost. You may want to spend more or less—but here's an estimating base.

Coming . . . *AM* for Aug. 6 will include our first Special Report on maintenance—this one dealing with maintenance of induction-heating equipment. A lead article will describe production planning by master schedule at Saco-Lowell, and another feature article will cover five special machine tools developed for Pratt Whitney production of jet-engine parts. There'll be shorter articles on contour forming, on cutting radii on a shaper, on tricks with brushes, and on die nomenclature.

RESEARCHER . . . A. William Meyer joined Brown & Sharpe Mfg. Co., Providence, R.I., as a drafting apprentice. After he'd served his time, he was transferred to the advertising department, then moved on to become head of the patent department. In later years he was appointed assistant director of design, and finally director of research, which position he now holds. In this capacity, he has recently done a considerable amount of research on profitable milling with HSS cutters, key results of which we prevailed upon him to describe in our current lead article.

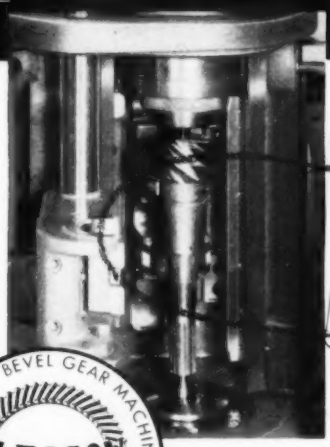
Mr. Meyer is a member of the Providence Engrg Society, the ASME, and with the latter organization interested in ASA activities.

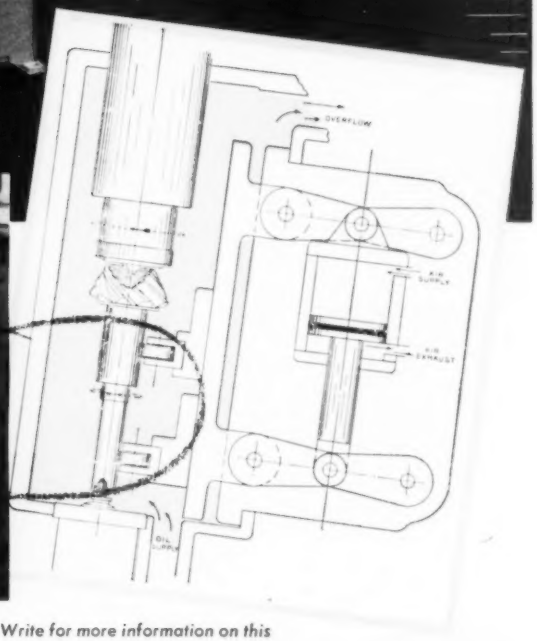
ELIMINATE DISTORTION
WITH THE GLEASON No. 16 PINION QUENCHING PRESS



The Gleason No. 16 Pinion Quenching Machine is a distinctively different type of quenching machine. It is designed with three multiple units, each operating independently of the other and assures continuous fast production of hardened pinions. Further straightening of shafts is unnecessary.

A pre-set metallurgically correct oil flow is provided which, when once set, makes this machine completely automatic in operation from the time the pinion is placed in the loader jaws until it has passed through the quench and returned to unloading position. During the quench, while rotating on centers, shafts are held against rollers to prevent distortion.





BUILDERS OF BEVEL GEAR MACHINERY · FOR OVER EIGHTY-FIVE YEARS · GLEASON

Write for more information on this modern way of pinion quenching.

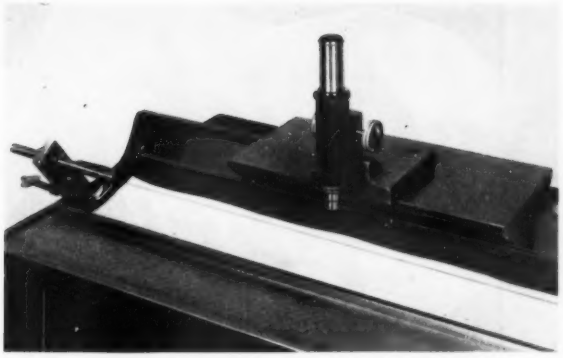
GLEASON WORKS

1000 UNIVERSITY AVENUE · ROCHESTER 3, NEW YORK

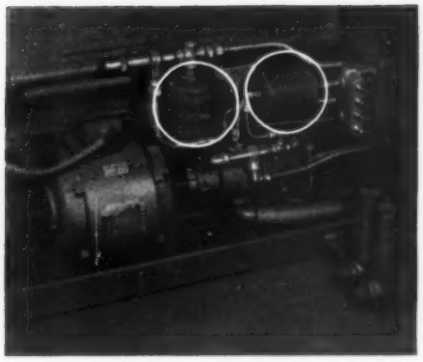
CINCINNATI

Grinding the bearing diameters of a large sleeve gear. Preventative maintenance goes a long way toward expediting precision grinding operations of this type.

Suggested method of precision leveling the machine.



Microscope aligning instrument, recommended for 72" and 96" length machines. (Extra equipment)



Hydraulic and way oil filters.

Helpful Hints for Long Service

From Your Cincinnati FILMATIC Plain Hydraulic Grinder

You have a right to expect long service from your centertype grinding machines. And it's easy to get it from Cincinnati's, for they give you a head start with their FILMATIC grinding wheel spindle bearings. A few points which require your periodic attention are:

LEVELING

Improperly leveled machines can be the source of many troubles. Jacks are built-in to facilitate the operation of leveling. Washers must be placed beneath the screws. Place the leveling instrument as indicated in the illustration; both lengthwise and across the ways.

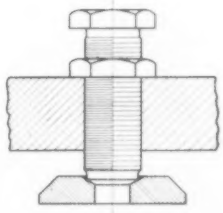
LUBRICATION

Lubrication of your CINCINNATI FILMATIC Plain Hydraulic Grinder is simple and easy; do not neglect it. As a reminder, make a lubrication chart, similar to the one in the instruction book, and attach it to your machine.

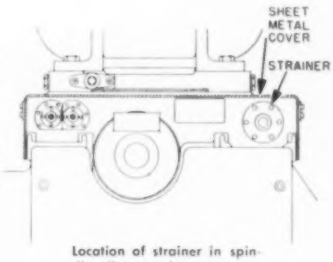
OIL FILTERS

Replace the hydraulic and way oil filters every six months. It's easy to do, and they're inexpensive. Remove and clean the spindle oil strainer every six months.

If you will take these three ounces of prevention, you will be well repaid in trouble-free, accurate performance for years. And if you're not acquainted with CINCINNATI FILMATIC Plain Hydraulic Grinding Machines, write for literature. Ask for catalog No. G-603.



Built-in leveling jacks provide a way to accurately level the machine.



Location of strainer in spindle oil reservoir.

CINCINNATI GRINDERS INCORPORATED
CINCINNATI 9, OHIO

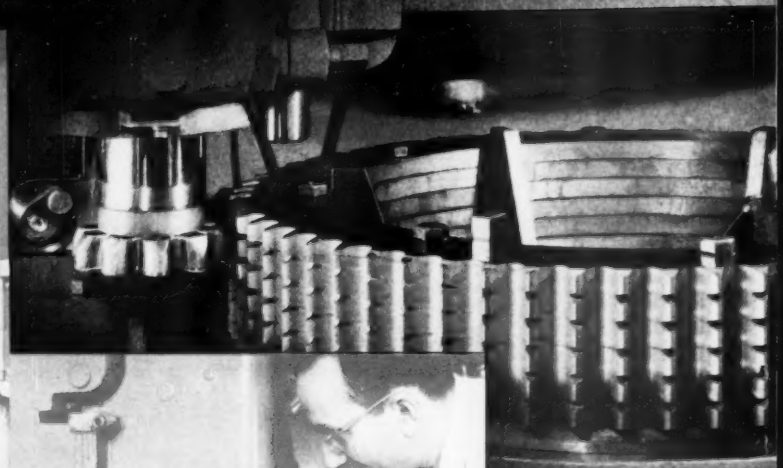
CINCINNATI

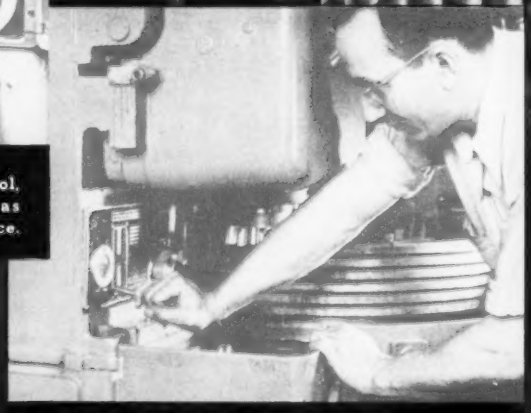
CENTERTYPE GRINDING MACHINES • CENTERLESS GRINDING MACHINES
CENTERLESS LAPPING MACHINES • MICRO-CENTRIC GRINDING MACHINES

Quick Changes

STROKES PER MINUTE Simple shift levers change cutter-strokes-per-minute in seconds. 12 changes available.

DEPTH OF CUT Dial control, graduated in thousandths, is as quickly adjusted, and locked in place.



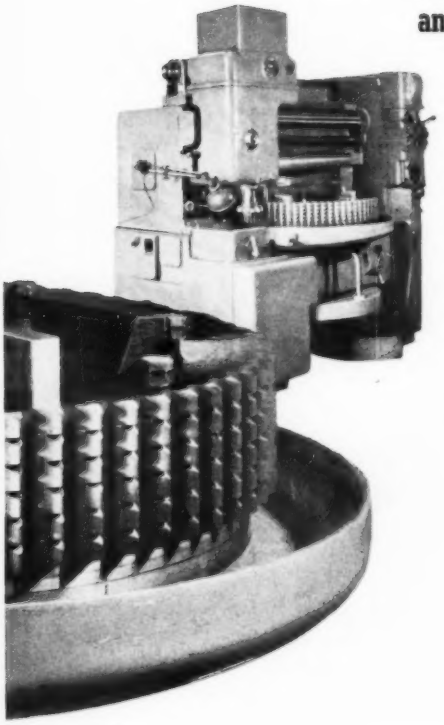


ROTARY FEED A quick change gear-shift selection of 4 rotary feeds—with 8 (or more) additional feeds by changing two "pick-off" gears.

..in Feeds and Speeds

A SPUR TO TOP EFFICIENCY

On Short-Run Production the 36-Type Gear Shaper's 'Gear Shift' Controls make it simple and easy to rough and finish at maximum feeds and speeds.



The simplicity of control and operating convenience of the 36-Type Gear Shaper actually encourages record performance on different-sized blanks—as here pictured on sprocket cutting at Silent Hoist & Crane Company's Brooklyn (N.Y.) Plant. . . . All in all it takes no more than 25 seconds to change settings for (1) cutter strokes per minute (2) depth of cut and (3) rotary feed.

←Note how the blanks (for 7/8" roller chains) are stacked 6-high, to take advantage of the full 6 inch face width capacity of the 36-Type Gear Shaper. Typical feed and speed data for roughing and finishing cuts follows:

	1st Roughing Cut	2nd Roughing Cut	Finishing Cut
Spkt. 28.00" O.D.			
4110 steel, 37 teeth,	Depth cut .550"	Depth cut .140"	Depth cut .175"
1.5" c.p., 1" face width	Feed .021"	Feed .0408"	Feed .0408"
5 pieces stacked	Strokes p.m. 41	Strokes p.m. 59	Strokes p.m. 59
Spkt. 32.867" O.D.			
1040 steel, 67 teeth,	Depth cut .600"	Depth cut .150"	Depth cut .150"
1.5" c.p., 29/32" f.w.	Feed .021"	Feed .032"	Feed .027"
6 pieces stacked	Strokes p.m. 41	Strokes p.m. 41	Strokes p.m. 41

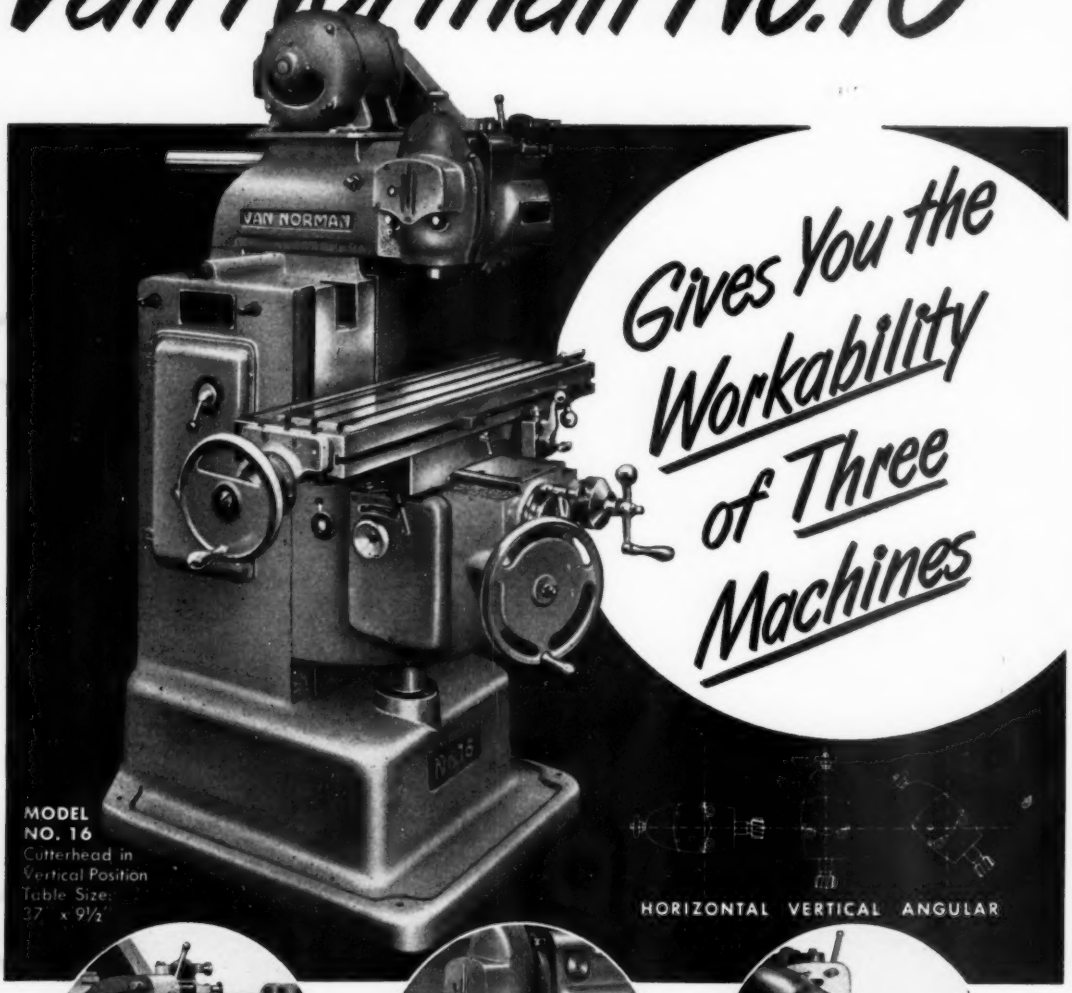
The same advantage in quick flexibility of control applies irrespective of the diameter and pitch of the work—with the same overall advantages of low production costs and cutter economy. . . . Precision quality of the work done can be held to any desired limits.

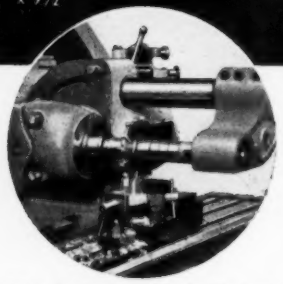
It's time to modernize! Your requirements in heavy duty gear cutting will profit by early investigation of the 36-Type Fellows Gear Shaper. For a catalog or a call, get in touch with the nearest Fellows Office.

Fellows

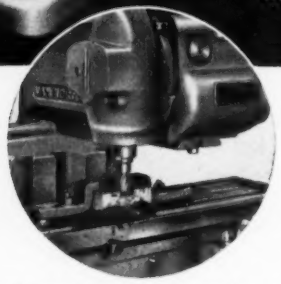
THE FELLOWS GEAR SHAPER COMPANY • Head Office and Export Department • 78 River Street, Springfield, Vermont
Branch Offices: 616 Fisher Bldg., Detroit 2 • 5835 West North Avenue, Chicago 39 • 2206 Empire State Bldg., New York 1

Van Norman No. 16

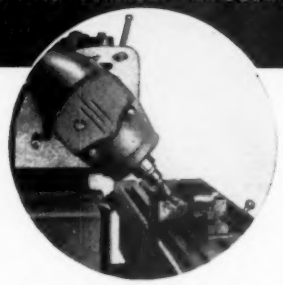

VAN NORMAN
Gives You the Workability of Three Machines
MODEL NO. 16
Cutterhead in Vertical Position
Table Size: 37" x 9½"
HORIZONTAL VERTICAL ANGULAR



With the cutterhead locked in horizontal position, the No. 16 is used for horizontal milling operation. Hardened stop set at factory assures positive 0° setting.



Illustrated, the No. 16 is used for a vertical milling operation. Permanently fixed hardened stop permits easy, accurate positioning of the cutterhead at 90°.



Here the adjustable cutterhead is set at 45° angular milling position. Horizontal, vertical, or angular milling all are easily performed on the No. 16 Miller.

Ram Type Miller

Here's a miller so versatile that it enables you to perform any and every milling job from horizontal to vertical . . . simply by positioning the adjustable cutterhead which is mounted on a movable ram. Why do you benefit . . . because with this one machine you have the work range of several single purpose millers. This enables you to keep the Van Norman miller working all the time . . . also many jobs can be carried through to completion without changes in the workpiece setup — saving time and reducing errors.

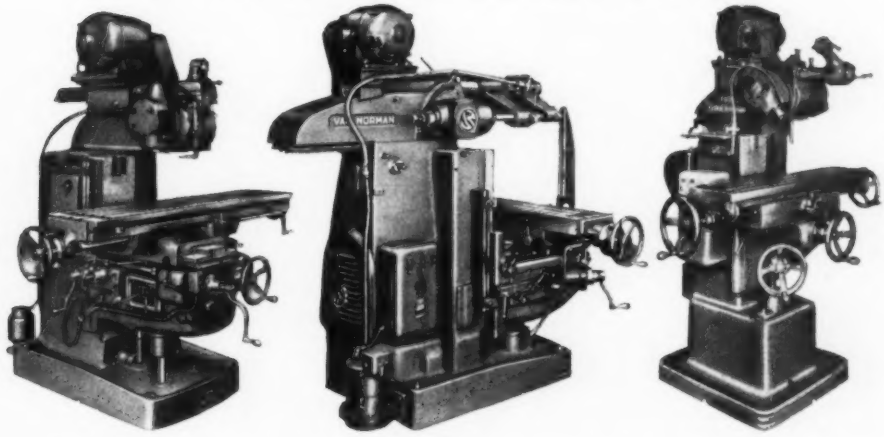
The Van Norman No. 16 Ram Type Miller gives you these additional advantages —

Conveniently grouped controls in front of knee makes operations easy. Power feeds are selected with a quick change feed selector. Large, easy-to-read dials.

Built-in electric controls simplify operation. Single lever selector controls spindle, feed and coolant. Push-button, on front of knee, starts and stops motors as pre-selected.

Rugged base and column, massive cutterhead, large ram and heavy knee, saddle and table assembly provide maximum rigidity and long life accuracy.

OTHER VAN NORMAN RAM TYPE MILLERS THAT REDUCE PRODUCTION COSTS



MODEL NO. 38
Cutterhead in Vertical Position
Table Size: 64" x 14"

MODEL NO. 22L
Cutterhead in Horizontal Position
Table Size: 45" x 10"

MODEL NO. 12
Cutterhead in Angular Position
Table Size: 37½" x 9 3/16"

VAN NORMAN COMPANY
SPRINGFIELD 7, MASSACHUSETTS

NOW . . . . . 36 PIECES

Other Indirect Savings in

WORLD'S LARGEST EXCLUSIVE MANUFACTURERS OF THREAD

THREADED INSTEAD OF 1

Tool Cost and Tool Inventory

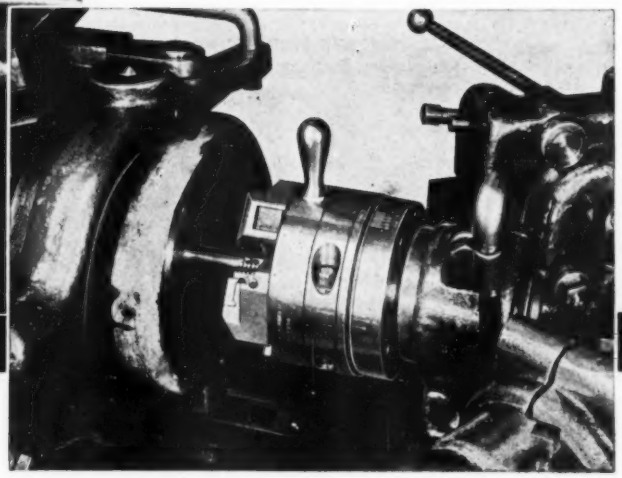
This manufacturer had cut threads on adjusting screws in the past by making several passes with a single point tool. Actual chasing time on the .623 in. diameter 8 pitch thread 1 3/8 in. long was 4.86 minutes.

LANDMATIC Die Heads were installed to perform these operations. Immediate savings were realized when actual threading time was cut to 8 seconds.

LANDMATIC Die Heads are well-suited to cutting these modified square threads. Rigid construction holds the chasers firmly—line contact with the work reduces friction and cutting strains—thus making it possible to produce the thread in a single pass.

Other savings accrued from LANDMATIC Heads. Interchangeable chasers can be re-ground singly, and for over 80% of their length. A single chaser can be replaced in the set. Chasers will maintain a more consistent thread form than a single point tool.

For more information about these cost-cutting tools, write for Bulletins F-80 and F-90.



LANDIS Machine COMPANY
WAYNESBORO, PENNA.

GENERATING EQUIPMENT

NEW LANDIS TOOL precision grinder

for large diameter work pieces

type CHW universal grinder

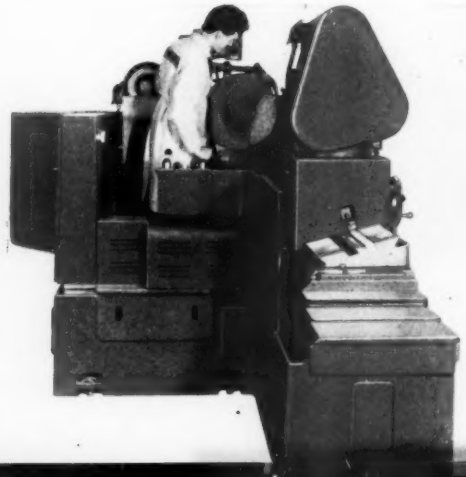
This new and versatile grinder is used for the precision grinding of many light parts with large diameters such as turbo-jet rotors, motor armatures, water valves and track carriers.

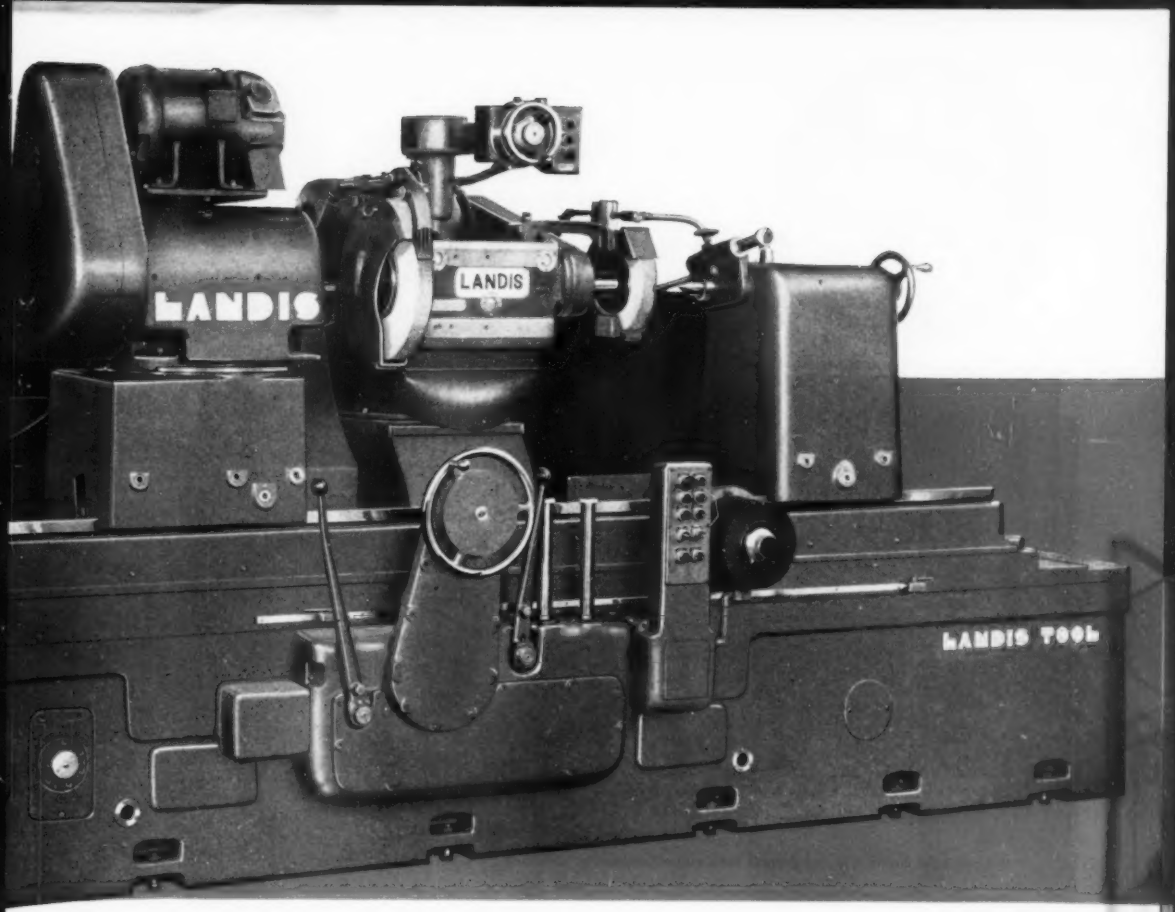
Standard sizes available are:

30" x 48"
30" x 72"
30" x 96"
30" x 120"
36" x 48"
36" x 72"
36" x 96"
36" x 120"
48" x 48"
48" x 72"
48" x 96"
48" x 120"

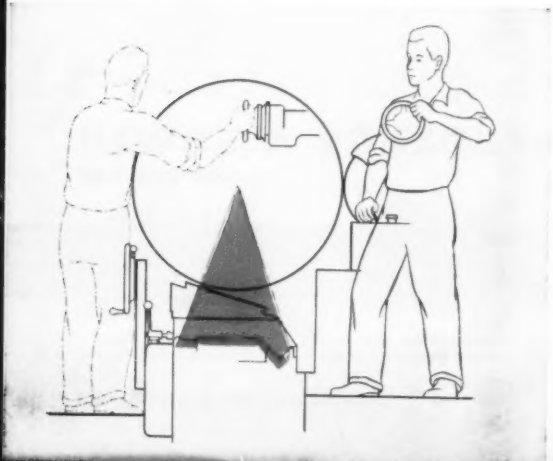
LARGE RIBBED T-SLOT FACE PLATE—For holding work pieces not suited to between centers grinding.

DUAL OPERATING POSITIONS AVAILABLE—Rear operation shown. Diagram shows front and rear operating positions.





EXTRA-WIDE CARRIAGE WAYS INSURE STABILITY— **Load** distribution triangle shows how wide spacing gives stability to work carrying members.



LANDIS TOOL

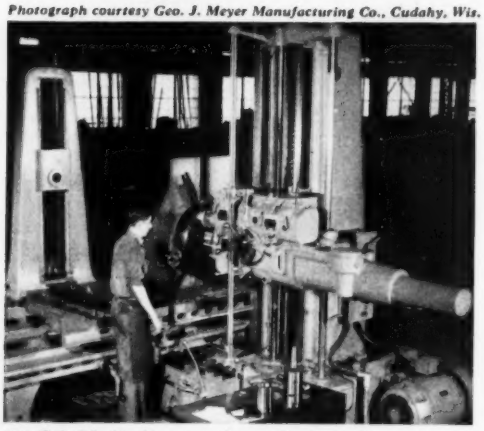
Precision Grinders

LANDIS TOOL COMPANY

WAYNESBORO, PENNA., U. S. A.

NEW SINGLE SPINDLE HIGH SPEED

Photograph courtesy Geo. J. Meyer Manufacturing Co., Cudahy, Wis.



340-T G. & L. Machine at work on a bottle machine component. Metal is removed faster than sawing, the method formerly used.

provides faster metal removal and closer speed selection

45 Speeds from 10 to 1300 rpm in Fine Progression Offer Operator Wide Choice Without Compromise . . . Permit Maximum Efficiency When Using Carbide and Cast Alloy Tipped Tools

Six entirely new features—combined with added designed improvements—permit taking full advantage of carbide and cast alloy tooling on the new single spindle, *High Speed* G. & L. Machine. In addition, the working range of this machine makes it highly adapted for all types of light, medium and heavy-duty machining where carbides are not required.

Improved Performance and Broader Capacity Obtained Through These New Structural Features:

1 **Hardened Ways on Bed and Saddle**—Heavy-duty, surface hardened ways maintain high machining accuracy over longer periods of time.

2 **Single Spindle**—This nitralloy steel spindle rotates from 10 to 1300 rpm. Speed changes are in fine geometric progression, permitting the operator to select the proper speed for the job.

3 **Automatic Positioning Device**—This unit reduces and often eliminates the need for special jigs and fixtures and minimizes operator responsibility for maintaining accuracy.

4 **Swiveling Pendant Control**—This control box is swung in a semi-circle to any position. Fingertip control enables the machine operator to watch work closely and with safety.

5 **Rapid Speed Change**—The operator may easily select any of the 45 spindle speeds without the necessity of reading a complicated chart.

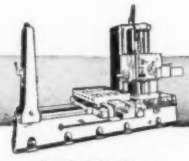
6 **Hardened, Accurate Gears**—Machine gears are cut and shaved, then flame hardened. Accuracy and precision of gear train assemblies insures unusually quiet operation at high speeds.

plus
- **Centralized Operation**
- **Directional Control Levers**
- **Simplified Maintenance**
- **Increased Working Range**—with higher column, longer beds, table and saddles.

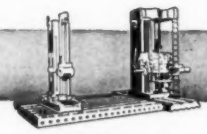
This G. & L. Machine has the capacity to handle all jobs within its range with ample margin of reserve capacity for occasional work of an unusual nature and size. Pace setting design of the new, single spindle, *High Speed* G. & L. Machine may easily solve your stubborn production problems. Ask experienced G. & L. engineers to recommend machining practices that will help you now. ***Write for New Bulletin 34-T.***

GIDDINGS & LEWIS
FOND DU LAC

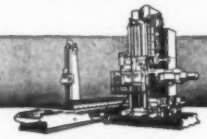
G&L HYPRO



G. & L. Table Type Horizontal Boring Machine



G. & L. Floor Type Horizontal Boring Machine



G. & L. Planer Type Horizontal Boring Machine

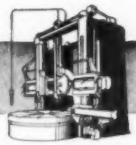
G&L MACHINE

New High Speed 340-T G. & L. Table Type Horizontal Boring, Drilling and Milling Machine. Note convenience of pendant control.

MACHINE TOOL COMPANY

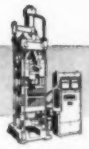
WISCONSIN, U. S. A.

Cincinnati Hypro Double Housing Planer



Cincinnati Hypro Vertical Boring and Turning Mill

Cincinnati Hypro Planer Type Milling Machine



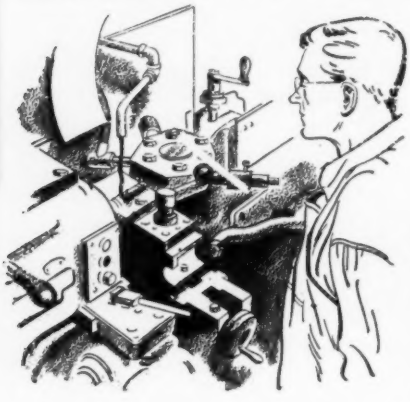
G. & L. Vertical Plastics Injection Press

DAVIS

Complete Tooling Service

TAPPING POINTERS..... by Red Shield

ALUMINUM. Using 8×32 special gun flute taps. Through holes. We suggested 8×32 commercial-ground, four-fluted machine screw taps with special surface treatment. Cut original tool cost and greatly lengthened life of taps.



SERVICE. The local distributor of Standard Tool Co. products will see that you get the help of our Red Shield Service Staff to help on your metal cutting problems. Write for free booklet, "TAPPING DATA".

ALLOY STEEL. Using regular cut thread taps on turret lathe. Through holes. We recommended high-speed, commercial-ground spiral point plug taps with special surface treatment. Also showed them how to sharpen taps. Result: 500 to 1,000 more pieces per grind.

STANDARD TOOL CO. DEPT. 2-A, 3950 CHESTER AVENUE CLEVELAND 14, OHIO

New York · Detroit · Chicago · San Francisco

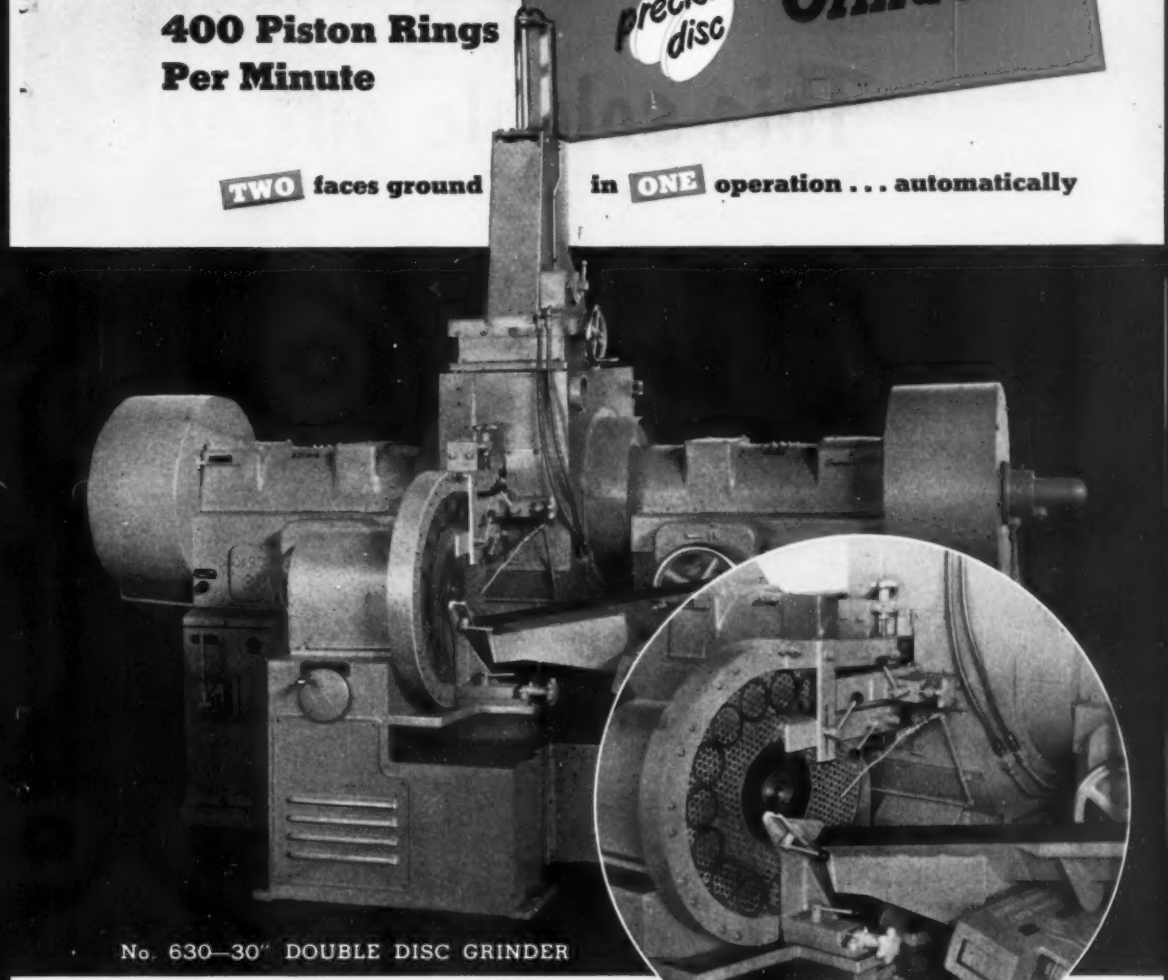
THE STANDARD LINE: *Drills • Reamers • Taps • Dies • Milling Cutters • End Mills • Hobs • Counterbores • Special Tools*

GARDNER

precision disc Grinders

Finish Grinds 400 Piston Rings Per Minute

TWO faces ground in ONE operation . . . automatically



No. 630—30" DOUBLE DISC GRINDER

Grinding piston rings from 2½" to 5½" diameter. Power-operated dresser. Tolerances: .0001" for parallelism and .0003" for uniformity.

For lower production costs investigate the Gardner TWO in ONE method.

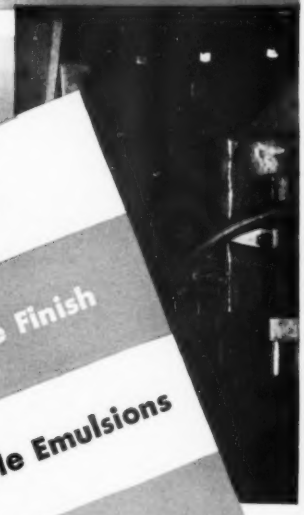
NEW MAGNETIC FEEDER with inclined, vibrating work trough carries rings thru machine between adjustable guide bars.

100M

GARDNER MACHINE COMPANY

410 East Gardner Street • Beloit, Wisconsin, U.S.A.

This soluble oil Ends



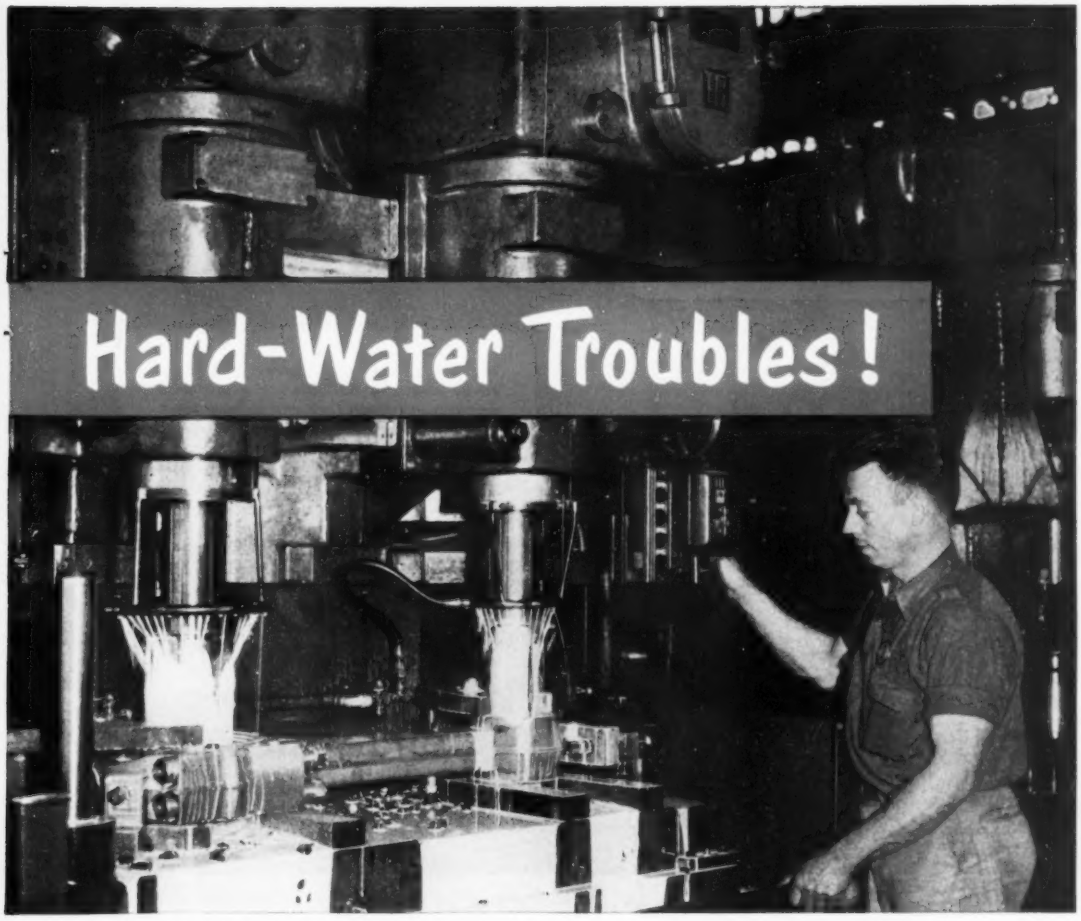
No Rusting

Enhances the Finish

Forms Stable Emulsions

Kind to Skin

SINCLAIR Lubricants



It is not necessary to check your water supply continuously for hardness when you use Sinclair EMULSICOOL for making your cutting emulsion. This specially-developed soluble oil mixes readily into a stable emulsion even under the most severe hard water conditions. In fact it is an "all-water" soluble oil.

Sinclair EMULSICOOL forms an emulsion that does not foam or separate. It helps produce a fine finish in cutting and grinding operations. It will not cause rust, is harmless to the skin, and does away with troublesome gumming of the machine. You'll find EMULSICOOL is economical to use.

Let EMULSICOOL* demonstrate its merits on one of your precision jobs.

(*Reg. U. S. Pat. Off.)

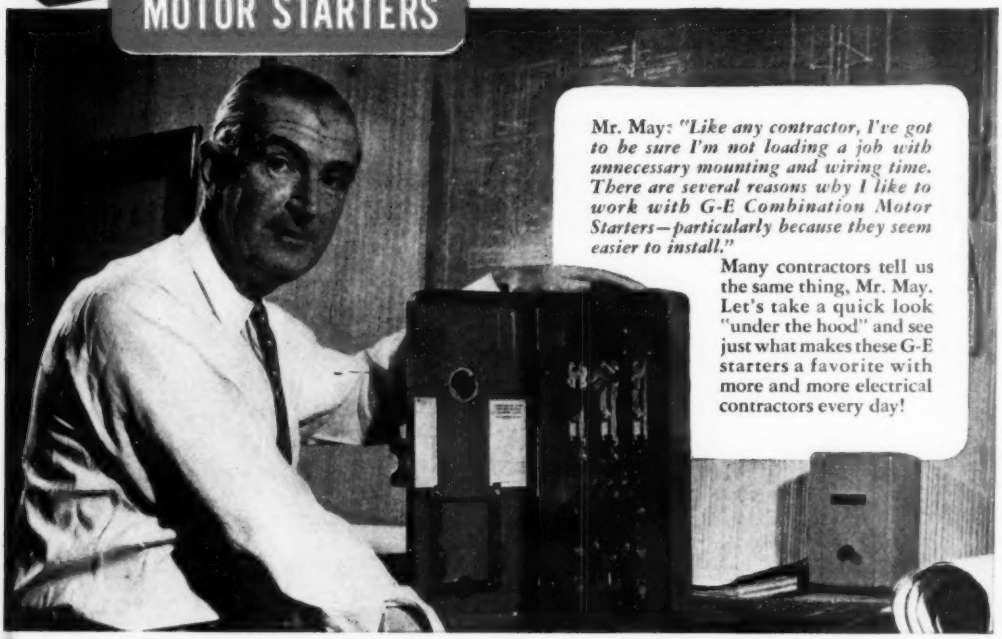
and Coolants for Metal Working

For lubrication counsel, see your nearest Sinclair representative or **write direct to Sinclair Refining Company, 630 Fifth Avenue, New York 20, N. Y.**

COMBINATION MOTOR STARTERS

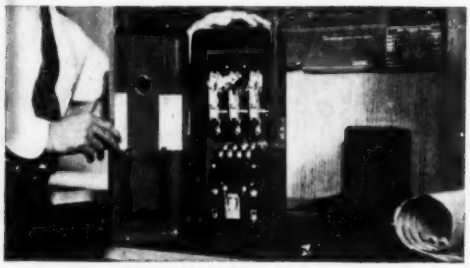
...save wiring

E. G. MAY, ELECTRICAL CONTRACTOR,

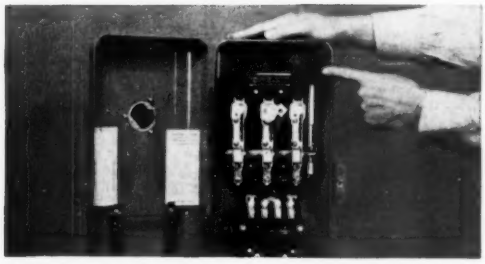


Mr. May: *"Like any contractor, I've got to be sure I'm not loading a job with unnecessary mounting and wiring time. There are several reasons why I like to work with G-E Combination Motor Starters—particularly because they seem easier to install."*

Many contractors tell us the same thing, Mr. May. Let's take a quick look "under the hood" and see just what makes these G-E starters a favorite with more and more electrical contractors every day!



1 Mr. May: *"Suppose we start with the mounting. There's a real time-saver!"*
That's right, Mr. May. Both starter and disconnect switch are mounted in one case. Thus, they're installed as a unit! You save wiring time and your customer gets a neater installation!



2 Mr. May: *"Wiring room is mighty important to a contractor."*
Then you should like the layout of this starter. There's plenty of room at top and bottom for line and load wiring. Of course, we take care of wiring the disconnect switch to the starter at the factory.

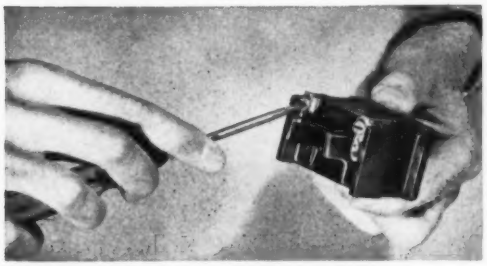
GENERAL ELECTRIC

730-24

time for these 4 reasons

REVEALS THE "REASONS WHY" HE PREFERS G-E COMBINATION STARTERS

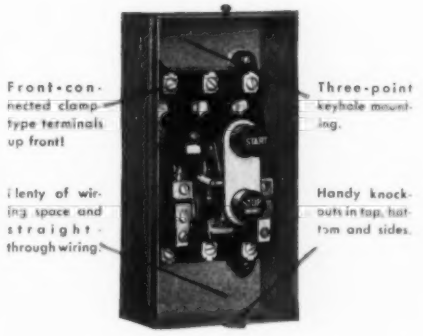
3 Mr. May: *"Having these terminals up front makes them easy to work with!"*
Remember, too, you're working with large pan-head screws. All you do is strip the wires, slide them under the terminal clamps which ride out with the screws, and then tighten. All terminals are big, rugged and permanently anchored.



4 Mr. May: *"I've heard a lot about this coil. What's so different about it?"*
It's completely encased in plastic—so that neither you when installing the starter, nor your customer when servicing it can damage the coil with a slipping screwdriver; and you can assure your customers that these "Strong Box" coils last longer because water, dust and oil are *sealed out!*

G-E Manual Starters ...easier to install, too!

For manual starting of 7½ hp or smaller motors, you can't beat a G-E starter for easy installation, long life. Built to the same rugged specifications as the magnetic starter, it includes many of the same features for quick-wiring:

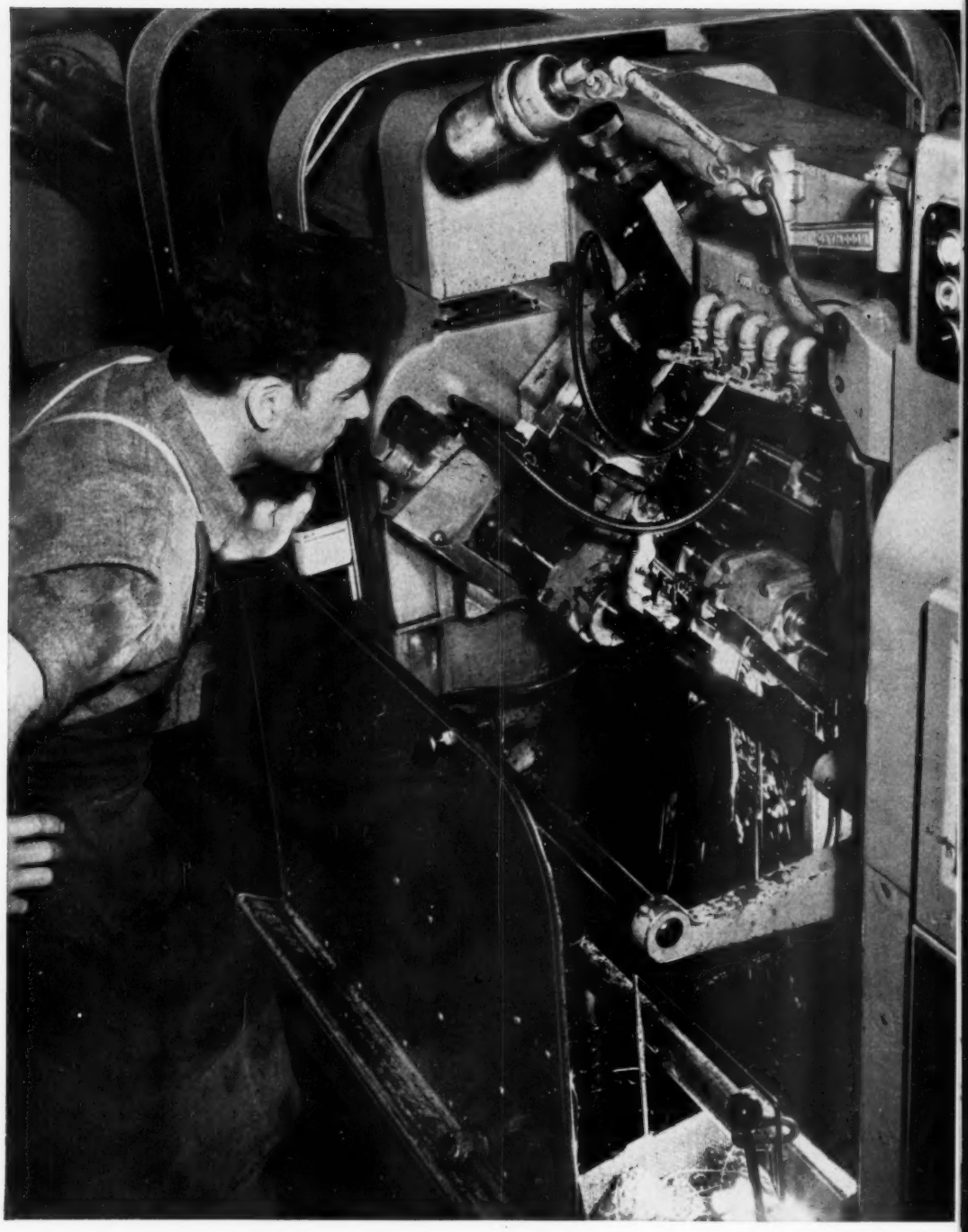

Front-connected clamp-type terminals up front!
Three-point keyhole mounting.
Plenty of wiring space and straight-through wiring.
Handy knockouts in top, bottom and sides.

These starters are available with either push-button or toggle-switch operation, and can also be obtained in water-proof, dust-proof, or explosion-proof enclosures . . . 2-, 3-, or 4-pole forms.

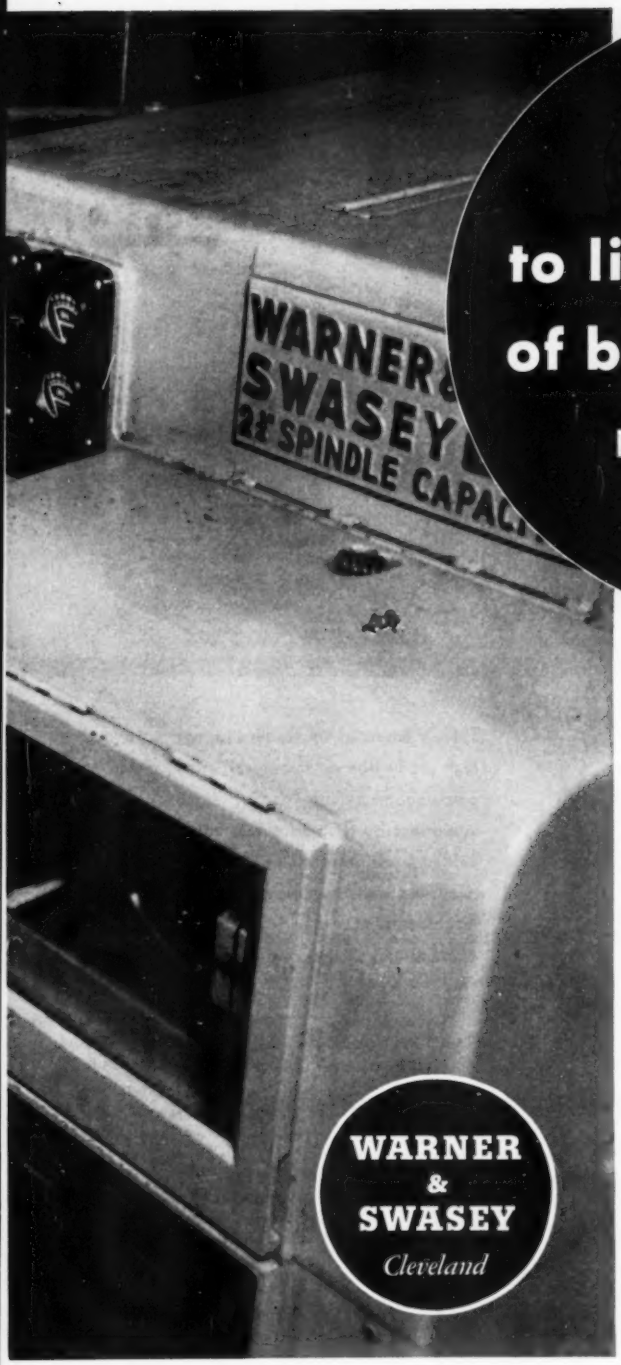
G.E. also offers a complete line of control accessories to make operations more automatic . . . more convenient.

BUY ONE AND COMPARE!

Take any G-E motor starter apart and inspect it. See for yourself why G-E starters last longer, cost less to install, and are easier to maintain than any starters you can buy. Your G-E representative or authorized distributor can supply many models of G-E starters in NEMA sizes 0, 1, 2, and 3 for motors up to 50 hp; anticipate your requirements and place your order early. For more information on magnetic starters, write for Bulletin GEA-5153; manual starters, Bulletin GEA-1522. Section 730-24, *General Electric Company, Schenectady 5, N. Y.*



YOU CAN MACHINE IT BETTER, FASTER, FOR LESS WITH WARNER



One way to lick shortages of both men and machines

• If yours is like many companies, you need to buy new machine tools and hire new men—both scarce—to meet today's huge production demands.

The new Warner & Swasey automatics are designed to help you solve *both* of these problems.

These automatics—either single or 5-spindle machines—are ideally suited for certain types of work, even in small or medium lot runs. In your plant, one or two automatics can possibly take the place of as many as five hand-operated machines. Savings in investment and floor space are obvious.

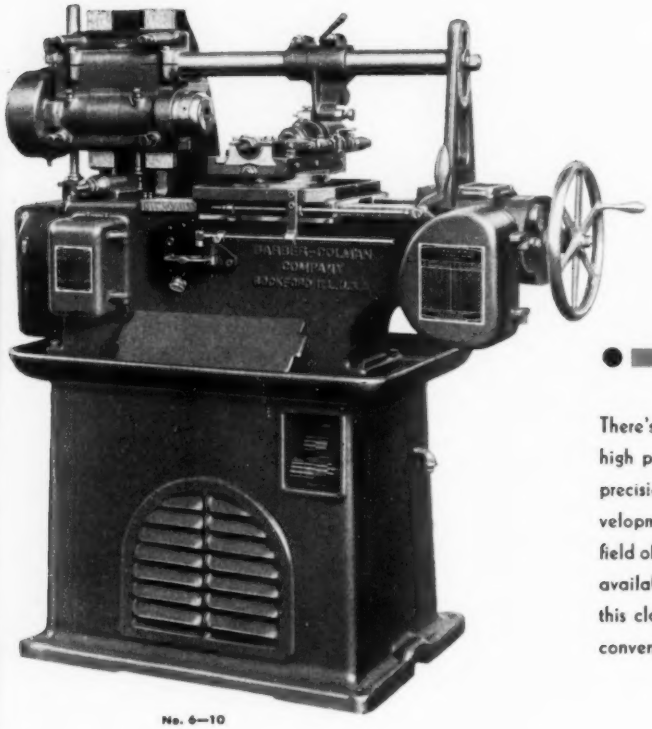
And one man can generally operate two or more automatics. This fact, coupled with the greater capacity of each automatic—from two to five times that of a hand-operated machine—can step up his productivity tremendously.

So when you need new machine tools, don't reorder on the basis of previous experience alone. Talk it over with your Warner & Swasey Field Engineer. He may again recommend turret lathes, but perhaps he'll show you how you can do your particular job better and more profitably with automatics.

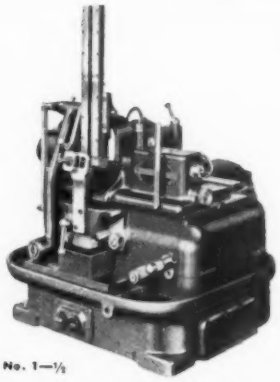
& SWASEY TURRET LATHES, AUTOMATICS AND TAPPING MACHINES

production ...

WHEN YOU WANT
ON SMALL FINE PITCH GEARS TO 268 D.P.
WITH TOOTH SPACING LIMITS AS CLOSE AS .0002"—



No. 6—10



No. 1—½

There's no need to sacrifice accuracy to get high production on instrument, clock, meter or precision mechanism gears. Continuous development by Barber-Colman engineers in the field of precision small fine pitch gears has made available the same production capacities for this class of work that is common in the more conventional pitches and sizes.

COMPLETE GEAR HOBBING SERVICE

BARBER COLMAN

HOBS • MACHINES • SHARPENING • TECHNICAL DATA

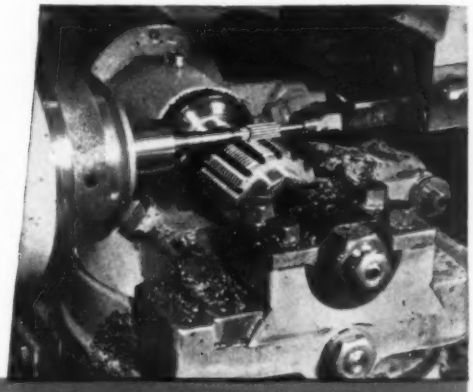
BUILDERS OF PRECISION GEAR

Barber-Colman

HOBBING MACHINES

These are Typical Jobs!

Shown In Relative Size To A Paper Clip



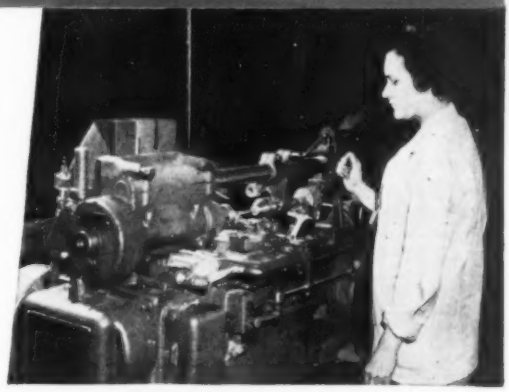
Detecto Scales, Incorporated, Finish-Hobs 7-Tooth Pinion ▲ Every 5 Seconds

This Barber-Colman finish-hobbing operation produces pinion teeth within .0002" adjacent tooth spacing limits, holding .0015" concentricity. Hobbing cost per pinion is negligible with hobbing time of *5 seconds* and hob life of *18,000 pinions* per sharpening. One operator services a battery of six machines, loading and unloading with quick-acting center bracket. Here are the specifications: 7-Tooth pinion, .346" O.D., 3/4" face B1113 Steel. Hob — Barber-Colman, Ground, Topping, *Multithread*, 18,000 pinions per sharpening. Feed per rev. of work—.050", Hob Speed—533 rpm.

Instrument Manufacturer Hobs 3600 Gears per Hour ▶ 120 D.P., .0003" P.D. Runout, .0002" adjacent Tooth Spacing

Typical of a range of fine pitch gear work in the plant of a large precision instrument maker, this hobbing job requires a high degree of finish and accuracy on a high volume basis. A battery of three machines produces 3600 gears per hour. Close tolerances are consistently maintained at this rate of production. Fast loading and unloading is accomplished with air-operated tooling equipment. Here are the specifications: 50-Tooth Spur Gears, 120 D.P., .433" O.D., .031" face, Brass. Hob — 1-1/8 x 1 x 1/2", Ground, *Multithread*. Feed per revolution of work—.150", Hob Speed—183 rpm.

Send for a copy of Facts About Fine Pitch Hobs.



When you require *small gears*, in *pitches as fine as 268 D.P.* (200 D.P., Ground Hobs; 150 D.P., Carbide Tipped Hobs) in *high volume* and with *close limits* of tooth accuracy and concentricity, call your Barber-Colman representative for assistance. With the precision and engineering built into the hobs and machines, he can help you reduce such problems to ordinary gear cutting procedure.

Barber-Colman Company

GENERAL OFFICES AND PLANT, 117 ROCK STREET, ROCKFORD, ILLINOIS, U.S.A.

H O B S A N D M A C H I N E S S I N C E 1 9 1 1

More output per man,

Production Increased 29%

Grade: MX
Size: ¾" Hexagon
Part Name: Master Cylinder Outlet
Machine: 1¼" RA-6 Acme-Gridley
Operations: Forming, drilling, threading, shaving, turning, cut-off

Comparative Production:

Grade	SFM	Spindle Speed rpm	Seconds Per Part	Hourly Output Rate	Actual Hourly Output*
B-1113	213	942	7¾	465	326
MX	275	1215	6	600	420

Results: Increase in production rate, 29%; increase in surface feet and spindle speed, 29.1%; increase in tool feed, 7.38%. Finish greatly improved.

*Based on 70% efficiency.

Cold-finished material furnished by Canadian Drawn Steel Company, Ltd.

Production Increased 33⅓%

Grade: MX
Size: ½" Hexagon
Part Name: Tube Nut
Machine: ½" Davenport Model "B"
Operations: Forming, drilling, threading, reaming, cut-off

Comparative Production:

Grade	Surface Feet for forming	Surface Feet for drilling	Spindle Speed rpm	Feed for Drill	Seconds Per Part	Hourly Output Rate	Actual Hourly Output*
B-1113	257	139	1700	.0067	2.4	1500	1050
MX	292	157	1930	.0085	1.8	2000	1400

Results: Increase in production rate 33⅓%; increase in surface feet and spindle feed, 13.6%; increase in drill feeds 25.4%, increase in drill surface speed 13.6%. Finish greatly improved.

*Based on 70% efficiency.

Cold-finished material furnished by Canadian Drawn Steel Company, Ltd.

Production Increased 50%

Grade: MX
Size: ⅝" Hexagon
Part Name: Hose End Blank
Machine: 1¼" RA-6 Acme-Gridley
Operations: Forming, drilling, reaming

Comparative Production:

Grade	SFM	Spindle Speed rpm	Seconds Per Part	Hourly Output Rate	Actual Hourly Output*
B-1113	221	1166	6	600	420
MX	290	1536	4	900	630

Results: Increas in production rate, 50%; increase in surface feet and spindle speed, 31.8%; increase in tool feed, 15.9%.

*Based on 70% efficiency.

Cold-finished material furnished by Canadian Drawn Steel Company, Ltd.

per machine, per hour . . . when you do the job with MX

today's freer-cutting screw stock!

UP in Canada, too, manufacturers of screw machine parts know a good thing when they see it. Look over these figures on increased production that one of the biggest parts producers across the border has obtained by switching from ordinary Bessemer screw stock to MX.

Here again, as in shops in this country where U·S·S Free-Machining MX has been put to work, output per man, per machine, per hour has increased. In addition, costs have dropped and part finish has been improved.

While production increases of 29%, 33⅓% and 50% like those shown here are important, equally important is the fact that MX, because of its greater uniformity and better machinability, will permit you to turn out quickly and to close tolerances the more intricate and precise products you are being asked to produce.

What's more, MX will cut the cost of *any* part you now machine from ordinary Bessemer screw stock, even though MX costs a little more. We base this claim on the amazing results obtained with MX to date, in producing over a billion parts of many different kinds.

U·S·S Free-Machining MX more than pays for itself by (1) increasing the rate of production which *lowers the cost per part*. By (2) prolonging tool life which *reduces machine down-time*. By (3) assuring better part finish which often *eliminates extra finishing operations*. By (4) providing closer dimensional accuracy which *minimizes rejections*.

You owe it to yourself—and to your customers—to give MX a trial.

U·S·S Free-Machining MX is being produced in all the popular screw stock sections and sizes. You can obtain it in cold-finished form from your regular supplier as "MX," or under his own identifying trade name. In hot-rolled form, MX is available direct through our nearest district sales office.

Now, when production is more important than ever—speed up the job with MX

IRON AND STEEL
SCRAP is a
VITAL DEFENSE MATERIAL
LET'S GET IT TO THE MILLS
IT MEANS MONEY FOR YOU
MORE STEEL FOR AMERICA

USS

AMERICAN STEEL & WIRE COMPANY, CLEVELAND • COLUMBIA STEEL COMPANY, SAN FRANCISCO
TENNESSEE COAL, IRON & RAILROAD COMPANY, BIRMINGHAM • UNITED STATES STEEL COMPANY, PITTSBURGH
UNITED STATES STEEL SUPPLY COMPANY, WAREHOUSE DISTRIBUTORS, COAST-TO-COAST
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

1-1182

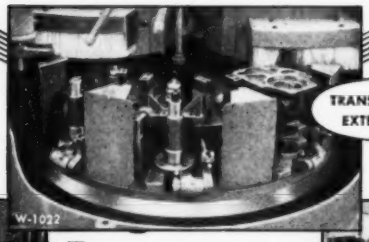
UNITED STATES STEEL

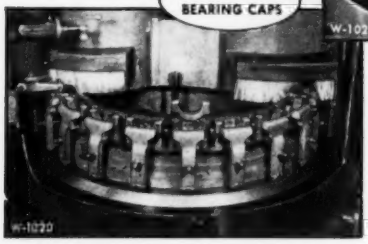
Put them on a Blanchard

NO. 16-A2 AUTOMATIC

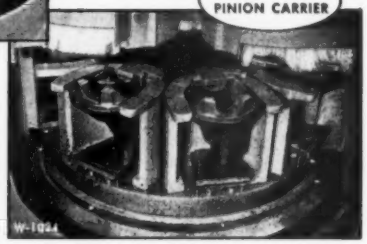
This two-spindle surface grinder is a real producer. In a single pass, the work is roughed by one wheel and then finished by the second wheel. Because each wheel can be selected for its part of the grinding operation, without having to compromise between roughing and finishing, the No. 16-A2 is particularly suited to work requiring high production. Close limits are assured by automatic size control for each wheel. If you're looking for maximum results with minimum effort, get production details on just how fast your own work can be done on the No. 16-A2.

Send blueprints or samples — there is no charge or obligation.





The joint face is ground by loading the cast iron part over a post, locating from a shoulder, supporting the flange by a spring bunter. It is clamped automatically. Parts are held flat to .001", square with bore to .002", and to ±.001" for size. 84 pieces ground per hour on one side.



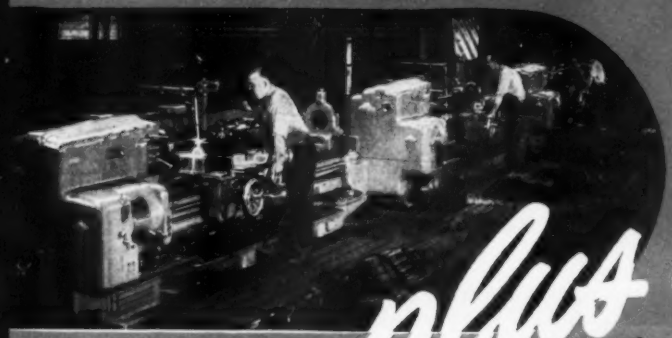
These cast iron caps are placed in suitable stations, automatically clamped, ground, and automatically unclamped. 1020 caps per hour are ground to ±.003", and flat to .002" in a 20 station fixture. 1/16" of stock is removed per side.

Send for your free copies of "Work Done on the Blanchard," third edition, and "Art of Blanchard Surface Grinding."

These cast iron parts are loaded with the flange under a "U" shaped block, clamped upward against the block. The four bearing surface "feet" are ground to limits of ±.003", parallel to flange within .001". 229 pieces are ground per hour on one side.

PUT IT ON THE BLANCHARD

THE BLANCHARD MACHINE COMPANY 64 STATE ST., CAMBRIDGE 39, MASS., U.S.A.



plus 3 minus 7

A Profitable Investment for *any* plant!

The world-renowned Otis Elevator Company recently installed three "AMERICAN" Duplicator Lathes which replaced seven engine lathes.

Such savings are the rule—not the exception—when "AMERICAN" Duplicators are put on the job.

These machines are performing "miracles" in savings in many of the largest and best known units of the metal working industry. They have introduced a new machining technique that has revolutionized the art of turning metal.

They reproduce work shapes from a template faithfully and accurately. They reproduce steps, tapers, right angle and tapered shoulders, recesses, grinding necks and radii, and are especially productive on such work as spindles, motor shafts, valve stems, back shafts, piston rods, axles and a wide variety of chucking work having irregular contours.

More and more the necessity of reducing manufacturing costs is crystallizing in the minds of management. The attention of directors, top officials and especially production executives is being focused to an increasingly greater degree upon cost-cutting equipment. It is inevitable, therefore, that the "AMERICAN" Hydraulic Duplicating Lathe should command the spotlight. Evidence from a hundred installations proves beyond a shadow of a doubt their leadership as top flight cost reducers.

If it's proof you want just drop us a line—no obligation.

THE AMERICAN TOOL WORKS CO. **Cincinnati, Ohio U.S.A.**

Lathes and Radial Drills

Designer's

Simplified design makes them easier to install and service!

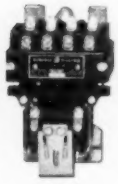
No doubt about it! Simplified design, for faster, easier installation and maintenance, has made these General Electric magnetic contactors—heart of the whole G-E line of starters— a big hit with machinery manufacturers. For instance:

- Terminals, easily accessible from the front, have large pan-head or slotted hex-head screws to speed wiring of either stranded or solid wire.
- Main poles in the three smaller sizes—and interlocks in all sizes—can be changed from normally open to normally closed without need of extra parts, facilitating quick changes and reducing your inventory of "specials."
- Extra two-circuit interlocks—with interchangeable normally open or normally closed contacts—can be quickly added to either side of contactor, need no drilling, no extra accessories.
- Arc hood is held in place by two easily-removed captive screws to expose terminals completely for inspection and maintenance.
- Three-point keyhole slots in rear of contactor make panel mounting a simple matter, and insulated aluminum base permits mounting on all types of panels.
- NEMA mounting dimensions mean maximum interchangeability.

Your G-E representative, or authorized G-E agent or distributor, can supply you in all NEMA sizes for a-c motors up to 50 hp. Meanwhile, get the full story in Bulletin GEA-5154.

MAGNETIC CONTACTORS

SIZE 00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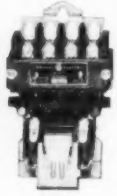
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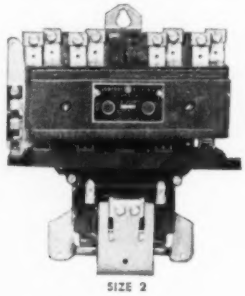
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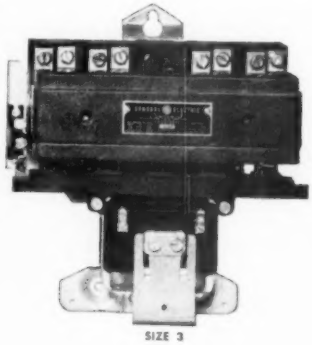

SIZE 3

GENERAL ELECTRIC

Digest

PRODUCT HIGHLIGHTS

A FULL LINE OF FHP MOTORS TO MEET YOUR NEEDS

Fhp machine-tool motor

This polyphase induction motor, specifically designed for frequent start-stop duty on machine tools, is one of a wide variety of G-E standardized fractional-hp motors available to meet your design needs. This complete line includes, for general applications, polyphase induction, d-c, capacitor-start, and split-phase motors, as well as gear and unit-bearing motors and a broad selection of definite-purpose motors for more limited applications. Specify one of these G-E motors in your next design. They're known to be preferred by your customers, play a big part in selling your product. See Bulletin GEA-5174.

SPEED, ACCURACY AND FLEXIBILITY —ALL IN ONE!

Photoelectric recorder

Besides measuring a-c and d-c volts and amperes, this versatile General Electric photoelectric recorder provides a quick, accurate record of almost anything that can be measured with an indicating instrument—temperature, speed, pressure, thickness, light, and vibration. In deflection and potentiometer types, for portable use or semi-flush mounting, it features chart speeds from ½ inch to 72 inches per minute, sensitivities as low as 1.0 microampere full scale, and response periods as fast as ½ second for full-scale deflection. See Bulletin GEC-254.

HOW TO SIMPLIFY "BUILDING-IN" THE RIGHT SPEEDS

Adjustable-speed manual

This 26-page illustrated manual—a worthwhile addition to your reference file—covers the entire subject of adjustable-speed drives, including their economic and engineering benefits and the points to consider in their selection. Especially helpful is a concise description of available General Electric ***packaged*** adjustable-speed drives, plus a well-organized table that summarizes the ratings and performance features of each drive. See Bulletin GEA-5334.

NOW—MOTOR SELECTION AND APPLICATION SIMPLIFIED

NEW G-E "SHOW-HOW" COURSE helps train your workers

Of special interest to designers is this new General Electric Motor Selection and Application Course—timed to meet today's need for more motor "know-how" by your personnel. A G-E More Power to America program, it shows simply and clearly how motors work, types now in use, how to select and apply them to specific jobs. Kit includes instructor's manual, nine slidefilms with records, student review booklets, and sturdy carrying case. Ask your G-E representative for a free copy of the manual. Meanwhile send for Bulletin GEA-4938-16 describing the course in detail.

General Electric Company, Section G 668-89
Schenectady 5, N. Y.

Please send me the following bulletins:

- ☐ for reference purpose
- ☐ in connection with immediate projects
  - ☐ GEA-4938-16 Motor selection and application
  - ☐ GEA-5154 A-c magnetic contactors
  - ☐ GEA-5174 Fractional-hp motors
  - ☐ GEA-5334 Adjustable-speed manual
  - ☐ GEC-254 Photoelectric recorder

CONSULT YOUR McGRAW-HILL ELECTRICAL CATALOG FOR PRODUCT ENGINEERS! You'll find "everything electric" for machinery manufacturers in the General Electric section.

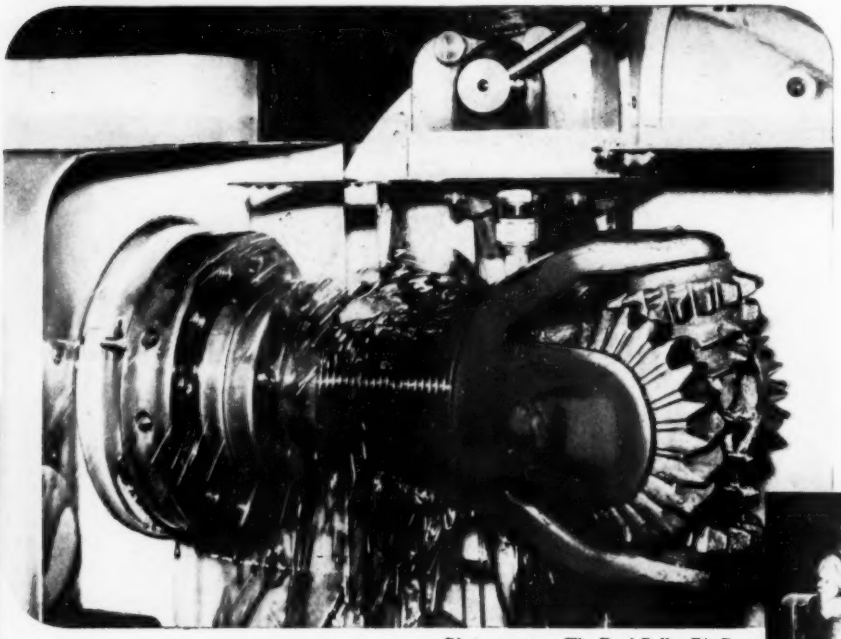
NAME _____

COMPANY _____

STREET _____

CITY _____ STATE _____

FACTS on improving production!



Photos courtesy The Reed Roller Bit Co.

4 inch diameter, 4 pitch API Threads ground from the solid in one pass of the wheel

The Reed Roller Bit Company's first concern is to maintain the highest possible quality in their products. They place special emphasis upon the development of improved manufacturing methods. A notable instance is their increased use of Jones & Lamson Automatic Thread Grinders.

These machines, in the skilled hands of Reed men trained in their operation, are helping to turn out better products for the drilling industry.

In addition to better quality threads and more uniform finish J&L Automatic Thread Grinders:

reduce handling costs
eliminate costly rethreading after heat treatment
eliminate expensive retooling when specifications change
reduce the cost of gage maintenance

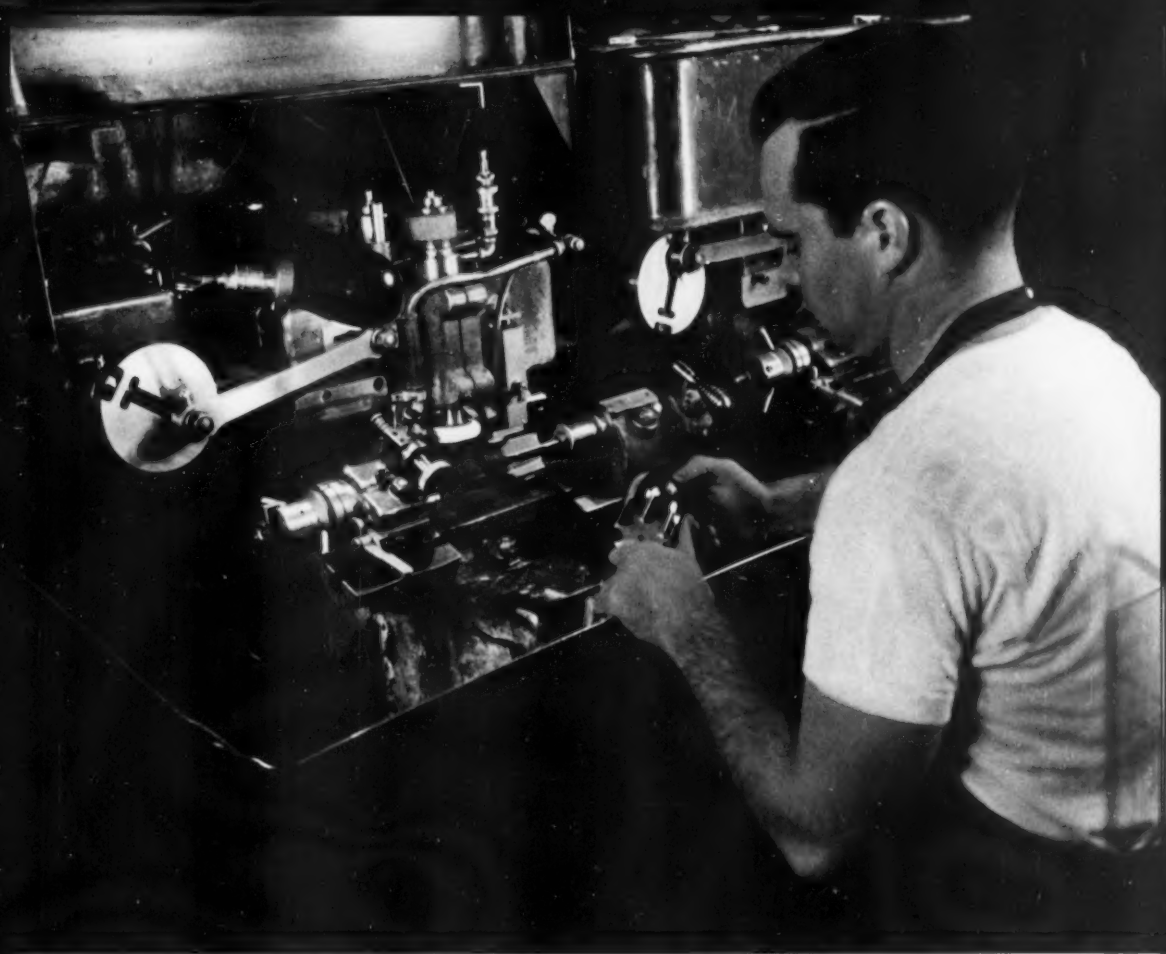
Now, more than ever, the most efficient machines and methods are needed to make the most of your available manpower and material. Jones & Lamson engineers are available to help you with your turning, threading and inspection problems. Write *today* to Department 710.

Turret Lathes—Fay Automatic Lathes—Thread Grinders—Optical Comparators—Threading Dies

JONES & LAMSON

MACHINE COMPANY
Springfield, Vermont, U.S.A.

Machine Tool Craftsmen Since 1835



Machine Ground Tap Flutes

Grinding Tap flutes is not just another operation to improve their appearance. Like Greenfield's precision automatic chamfering, this machine grinding operation imparts one more feature that makes "Greenfield" Taps TOPS.

Why? Because it assures accurate spacing and uniform cutting faces down to the very end of the tap. And the ground flute surfaces provide better chip slippage and disposal.

GREENFIELD TAP AND DIE CORPORATION
Greenfield, Massachssetts

BUY GTD GREENFIELD!

MEMORANDUM
FROM: PURCHASING
TO: SCREW MACHINE FOREMAN
Jack:
Just got some of these Geometric KD rotary heads in for those new screw machines.
The Geometric people say this type head works swell on this new equipment. Their field engineer will be in to look over the whole installation if you want him.
Sure is compact and rugged looking.
W. J. H.
3" SQ
3"
.498"
.500"
1/4" - 20 NC3
TAP DR. # 5 (.2055")

GEOMETRIC TOOL COMPANY DIVISION

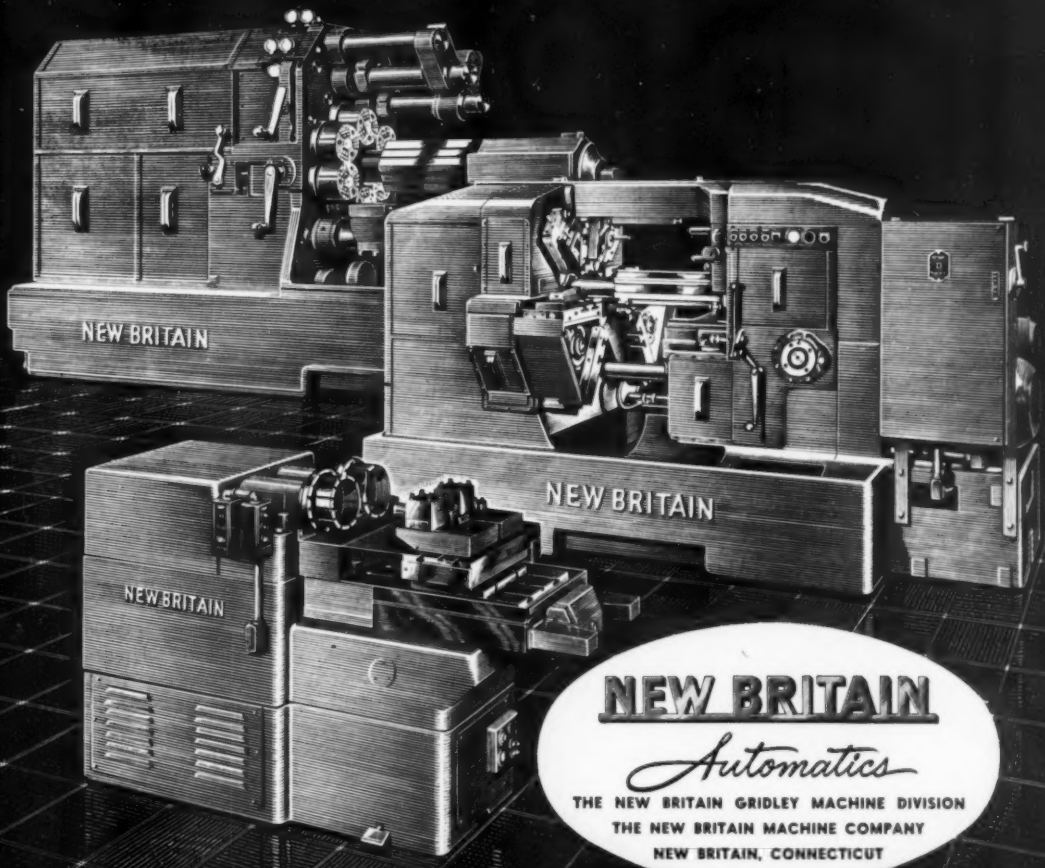
Greenfield Tap and Die Corporation

NEW HAVEN 15, CONNECTICUT

Designed for making fast work of slow jobs

AUTOMATIC BAR AND CHUCKING MACHINES • PRECISION BORING MACHINES

LUCAS HORIZONTAL BORING DRILLING AND MILLING MACHINES

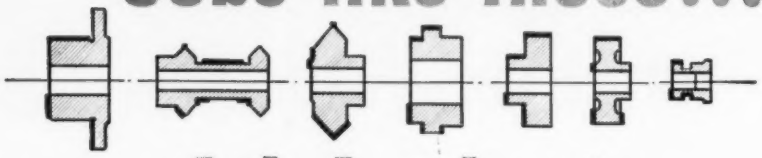


NEW BRITAIN

Automatics

THE NEW BRITAIN GRIDLEY MACHINE DIVISION
THE NEW BRITAIN MACHINE COMPANY
NEW BRITAIN, CONNECTICUT

Jobs like these...



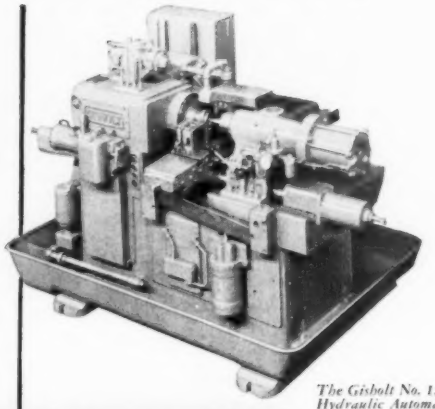
on a Job-Lot basis...

on Automatic Lathes?

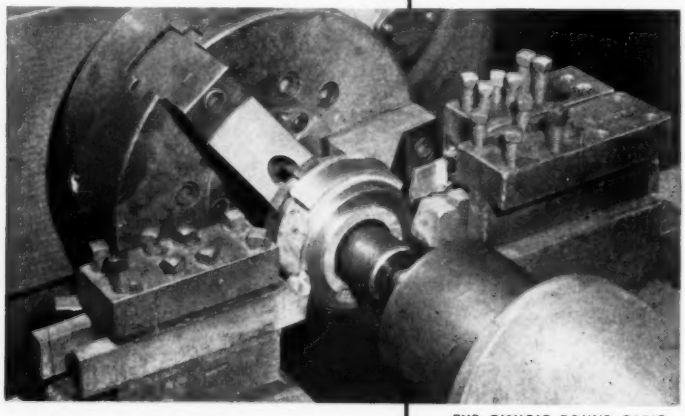
Absolutely! And these are only 8 of over 200 actual small-lot jobs handled on Gisholt No. 12 Hydraulic Automatic Lathes. The Crompton and Knowles Loom Works of Worcester, Mass., has *four* No. 12 Hydraulics busy producing and saving on work like this . . . and all with standard tool blocks!

Job-lot work like this—and like yours—is a natural for the No. 12 Automatic. The cost is no more than a hand-operated lathe for work this size . . . yet you have the added advantages of automatic machining and one-man operation of two or more machines.

If you have contract work like this, now or pending, it will pay you well to get the facts on the No. 12 Hydraulic Automatic Lathe. There's a big 24-page catalog free for the asking.



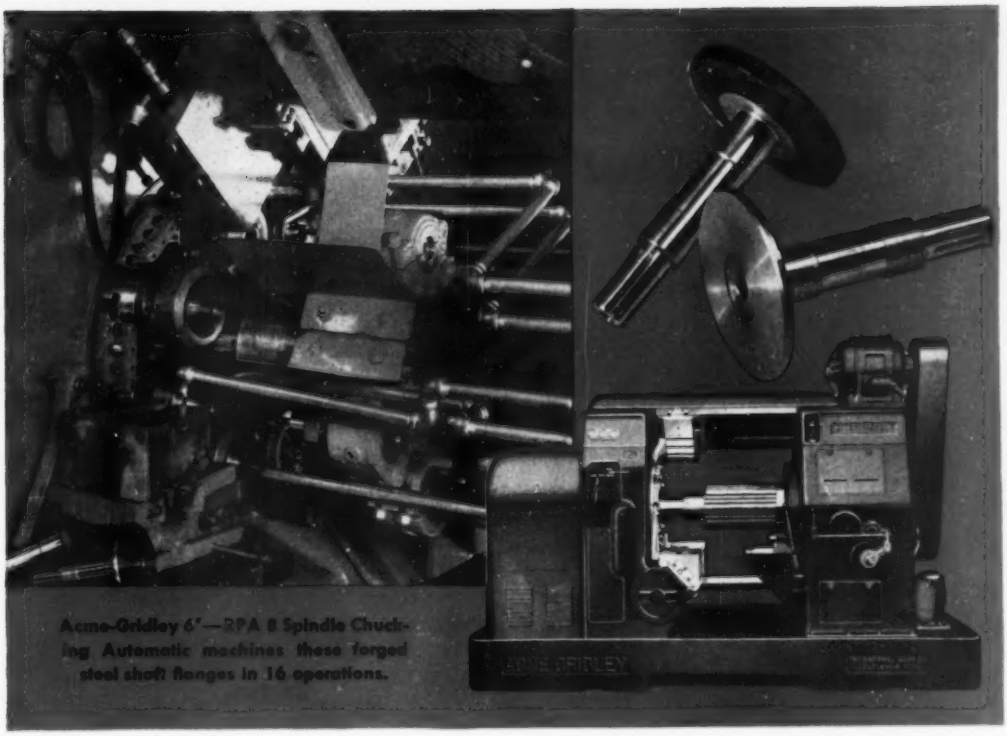
The Gisholt No. 12 Hydraulic Automatic Lathe gives you speed and accuracy plus *easy set-up.*



GISHOLT MACHINE COMPANY
Madison 10, Wisconsin

THE GISHOLT ROUND TABLE
represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.

TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • SPECIAL MACHINES



Acme-Gridley 6"—RPA 8 Spindle Chucking Automatic machines these forged steel shaft flanges in 16 operations.

ACME-GRIDLEY outperforms other automatic 30%

The flange on this forged steel shaft is completely machined—16 operations—in 22 seconds. That's Acme-Gridley *performance*—30% faster than on the modern competitive multiple spindle automatic it replaced.

The reasons for such performance (and this is by no means an isolated or unusual case) are inherent in the basic design features of the Acme-Gridley. Timesaving carbide-tipped tooling is provided for in the rugged, rigid frame construction; direct and positive camming result in sustained accuracy at high speeds—as fast as modern tools can take. And the machine's adaptability for a wide variety of tooling (including independent power-driven auxiliaries where desirable) permits an economical distribution of cuts to reduce total machining time.

These and many other features are built into every Acme-Gridley Automatic, to give you "more good pieces in the pan at the end of the day." For more complete details on Acme-Gridley 4, 6 and 8 Spindle Chucking Automatics, ask for Bulletin CM-43.

JOB-FACTS

PART—Forged Steel Shaft Flange (shank and spline previously machined)

MATERIAL—.40 Carbon Steel

OPERATIONS—16

TOOLING—Carbide Insert (except drills)

MACHINING SPEED—more than 500 s.f.m.

DRIVE—through Collet Chuck and Spline

MACHINE—Acme-Gridley 6"—RPA 8 Spindle Chucking Automatic

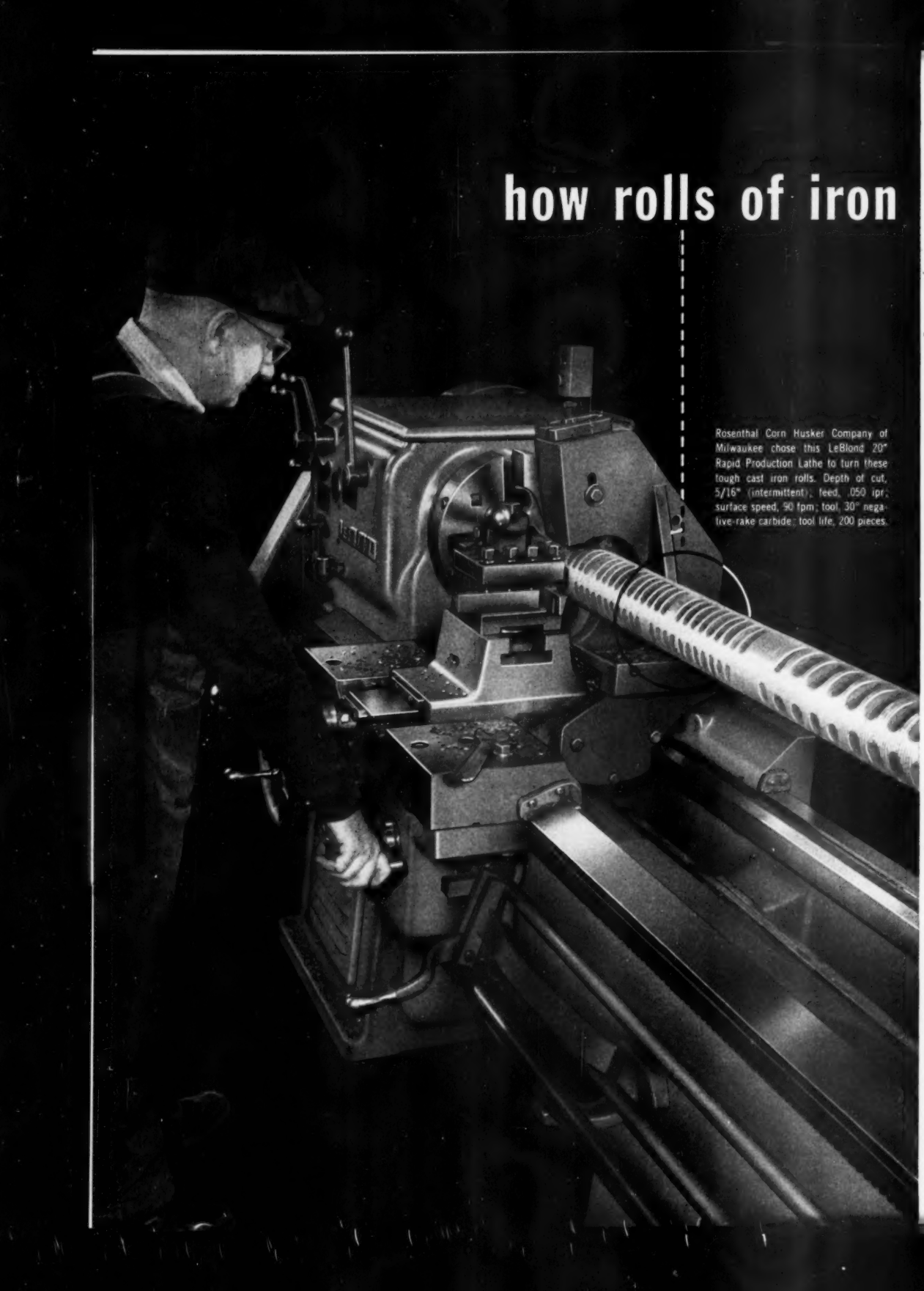
MACHINE TIME—22 Seconds (164/hr.)

The NATIONAL ACME CO.

170 EAST 131st STREET • CLEVELAND 8, OHIO

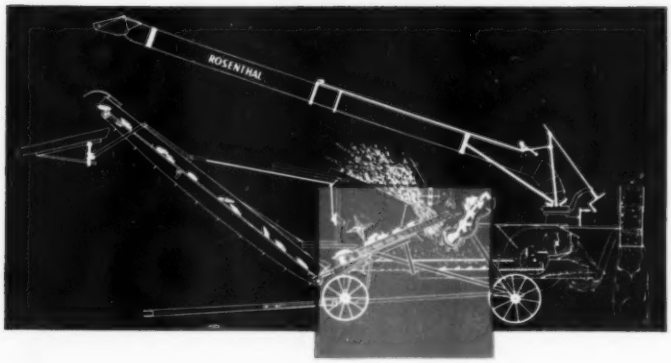
Acme-Gridley Bar and Chucking Automatics: 1-4-6 and 8 Spindle • Hydraulic Thread Rolling Machines • Automatic Threading Dies and Taps • The Chronolog • Limit, Motor Starter and Control Station Switches • Solenoids Centrifuges • Contract Manufacturing

how rolls of iron



Rosenthal Corn Husker Company of Milwaukee chose this LeBlond 20" Rapid Production Lathe to turn these tough cast iron rolls. Depth of cut, 5/16" (intermittent); feed, .050 ipr; surface speed, 90 fpm; tool, 30° negative-rake carbide; tool life, 200 pieces.

help put meat on your table



At the heart of machines that husk corn and shred the stalks into fodder are iron rolls like these! They help the farmer convert his crop to feed for livestock—the steers and hogs that become tender steaks and juicy hams for your table.

Rosenthal Corn Husker Company of Milwaukee, builders of husker-shredder machines for more than sixty years, needed a production lathe to turn these rolls . . . a lathe rugged enough to take the beating of a 5/16" intermittent cut at .050" feed and 90 surface feet per minute, and to withstand the forces of a 30° negative-rake carbide tool, cutting iron hardened by casting around a steel shaft!

On the recommendation of LeBlond's Chicago Office, they put a LeBlond 20" Rapid Production Lathe on the job. Result? *Three and a half years of rough yet trouble-free production . . . and many more to go!*

A LeBlond 20" Rapid Production will give you high production turning of a *variety* of work within the range you choose. It offers two speed ranges, 45 to 300 rpm or 67 to 450 rpm, and 18 feeds from .005" to .150".

Not a converted engine lathe, it has no quick-change box or leadscrew, expensive features unnecessary for production work.

Whether you're turning rugged rolls or precision shafts, there's a LeBlond Lathe to turn them faster, better. Your LeBlond Distributor will tell you about the 20" Rapid Production and other late models. Call him or write —

THE R. K. LEBLOND MACHINE TOOL COMPANY, CINCINNATI 8, OHIO

Ask for Bulletin RP-220 A for more information on the 20" Rapid Production Lathe.

turned faster by

LeBLOND *of Cincinnati*

WORLD'S LARGEST BUILDER OF A COMPLETE LINE OF LATHES • *FOR MORE THAN 63 YEARS*

Underwood gets over 975,000 extra hinges from Carboloy die

METAL BLANK (top) is pressure-fed into die made from Carboloy cemented carbide slotted bushing (middle). Formed hinge is then ejected sideways from die (bottom).

Switch-over to die of long-wearing Carboloy cemented carbide increases die life 4000%, virtually eliminates maintenance costs . . . illustrates savings you can get in your plant, too.

After forming only 25,000 hinge loops, hard-steel dies at Underwood Corporation had to be completely rebuilt. A die of Carboloy cemented carbide was substituted. It formed over a million pieces . . . required absolutely no maintenance, showed no detectable sign of wear.

More, Carboloy cemented carbides have replaced hard-steel on a multitude of noncutting operations at Underwood. Throughout its Bridgeport Plant, carbide forming, swaging and punching dies have outworn steel dies from 40 to 100 times; have eliminated costly downtime and maintenance on several jobs.

WEARPROOFING BENEFITS

With Carboloy dies, users everywhere report longer die life, better product finishes, closer tolerances, fewer rejects . . . all the wearproofing benefits that mean more production at a savings in time, money and manpower.

Get these savings yourself. If you have high-cost, time-wasting blanking, forming, punching or drawing operations, consult the Carboloy organization. We are headquarters for the finest in high-quality cemented carbides . . . first in carbide die design and application services, outlined below. Write for free data.

Get all the extras, too . . . FREE!

Carboloy services are designed to help you conserve your dies . . . give you new highs in production at a minimum of maintenance, maximum of savings.

DIE ENGINEERING MANUAL, D-124: Vital facts to assist you in proper application techniques of cemented carbides to dies and punches for more efficient sheet-metal drawing, forming, blanking, etc. Write for free copy.

DIE TRAINING SCHOOL: Practical courses to teach your die-room personnel how to get the extra from carbide dies. Includes specialized courses in finishing and servicing dies. Write for specific information.

DIE ENGINEERING SERVICE: Skilled, job-experienced Carboloy Field Engineers are ready at all times to assist you with your die problems. Contact your local Carboloy Field Engineer or write for this free service.

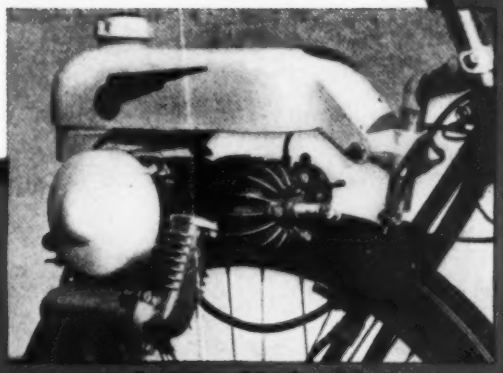
CARBOLOY
DEPARTMENT OF GENERAL ELECTRIC COMPANY
11149 E. 8 Mile Road, Detroit 32, Michigan

"Carboloy" is the trademark for the products of Carboloy Department of General Electric Company.

Specify CARBOLOY® CEMENTED CARBIDE

The Well Known MULT-AU-MATIC METHOD

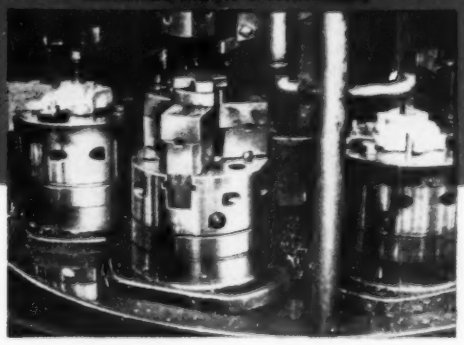
An excerpt from the publication "English Machinery"



The Production of the MINI-MOTOR . .

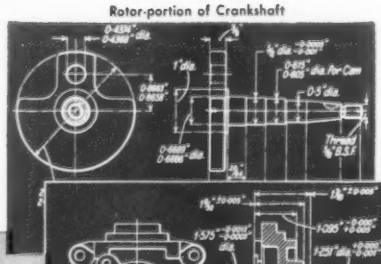
"Methods employed at the Croydon Works of Trojan, Ltd."

Although the activities of Trojan, Ltd., are mainly concerned with the manufacture of Trojan vehicles, both in I.C.-engined and electrically-powered versions, the Trojan engine, diesel engines, and many other products, the Mini-Motor has now assumed a position of considerable importance in this programme. This unit, which is at present being produced at the rate of 1,000 a week, is shown above, and comprises a 49.9-c.c. 2-stroke petrol-engine and fuel-tank that can be attached to any ordinary pedal-cycle by means of a few simple fittings. The fuel-tank, which is of rigid construction, serves as a mounting-chassis for the engine.

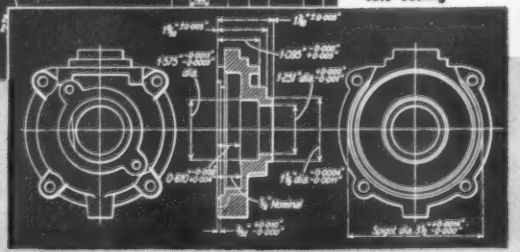


Whereas the Bullard Mult-Au-Matic Method is only one of the numerous phases of Trojan, Ltd. manufacturing processes, it speaks well for Bullard that Mult-Au-Matic was selected for one of the more accurate and important jobs.

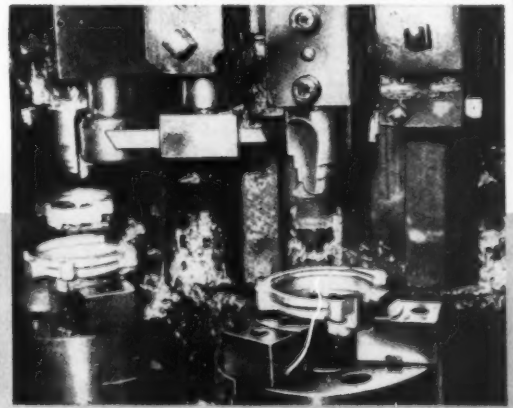
Rotor-portion of Crankshaft



Rotor-side Crankcase Casting



Machining mating Faces and registers on the Crankcase Castings



THE BULLARD COMPANY - BRIDGEPORT 2, CONNECTICUT

BANK ON MONARCH-

Cash in these Vital Production Savings

Production—production—more production—that's the pressure today. More and more output is needed, from every machine, operator, kilowatt and square foot. Are you getting work output that *can't be exceeded* by any new production methods—such as those offered by the most advanced types of modern Monarch Lathes? Before you say "Yes", study the Monarch plus values below. Figure how these savings might be translated into improved output for you. Then, let's get down to cases—and let a Monarch sales engineer furnish actual studies on the jobs you've got right now.

★ ★ ★ ★ ★

SAVE VITAL MATERIALS. Scrap losses, especially with unskilled manpower, can be high. Great reductions in spoilage occur when Monarch's duplicating methods replace the human factor in repetitive turning.

SAVE ON SUBSEQUENT OPERATIONS. With less stock left to remove, grinding time is often reduced by as much as 50%.

CONSERVE SCARCE SKILLED MANPOWER. Even green personnel can operate Tracer-Controlled Monarch Lathes, once the job has been set up.

MULTIPLY OPERATOR'S OUTPUT. Case histories show many instances where one Tracer-Controlled Monarch Lathe has replaced three or even four conventional machines. The fact that he can readily run two machines, on many classes of work, doubles the operator's output.

SAVE ON TOOLS. Save time and money on costly form tools—save on tool-sharpening and tool change time with the Monarch Tracer-Controlled single tool metal turning principle. Insert-type tools save even more! Let us show actual figures.

★ ★ ★ ★ ★

Want to cash in on these Monarch savings? We make a complete line of Production, Toolmakers' and Engine Lathes and *three* kinds of Tracer Controls applicable to most of them—the Monarch-Keller, Air-Gage Tracer and Motor Trace Controls. We'll gladly furnish complete information and data. Just ask us for Booklets, indicating your interests . . . *The Monarch Machine Tool Co., Sidney, Ohio.*

Monarch
ACCURACY • ECONOMY • LONG LIFE
TURNING MACHINES

FOR A GOOD TURN FASTER . . . TURN TO MONARCH

GET THE MOTOR that Cleans Itself

DROP YOUR MAINTENANCE COSTS to a new low by reducing motor cleaning operations and reducing inspections and overhauls. Tests have proved that on most applications totally-enclosed, fan-cooled motors more than pay back their extra cost in reduced maintenance. And this new Allis-Chalmers Type APZ tefc motor makes maintenance costs lower than ever before on this type of motor.

Here's Why

Concealed air passages and pockets have been eliminated; dirt cannot build up to cause overheating. Cooling air is blown over the ribbed cast iron frame and bearing housings carrying dirt away with it. How about oily dirt that sticks? It can be wiped or blown off without stopping the motor.

Rigid Construction

The frame is rigid cast iron which not only has high inherent corrosion resistance, but also holds bearings in alignment. Bearings are pre-lubricated at the factory and should need no attention for years. Tapped holes with pipe plugs to permit regreasing and to provide grease relief are standard equipment.

Get All The Facts

The new Allis-Chalmers Type APZ totally-enclosed fan-cooled motor is built in all NEMA standard frame sizes from 224* to 505. Also in explosion-proof type. Your A-C Authorized Dealer or District Office has complete information. Call today, or write Allis-Chalmers, Milwaukee 1, Wisconsin. Ask for Bulletin 51B6144. A-3398

Sold . . .
Applied . . .
Serviced . . .

by Allis-Chalmers Authorized Dealers, Certified Service Shops and Sales Offices throughout the country.

CONTROL — Manual, magnetic and combination starters; push button stations and components for complete control systems.

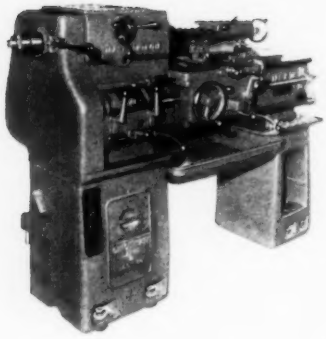
TEXROPE — Belts in all sizes and sections, standard and *Vari-Pitch* sheaves, speed changers.

PUMPS — Integral motor and coupled types from ¾ in. to 72 in. discharge and up.

Texrope and *Vari-Pitch* are Allis-Chalmers trademarks.

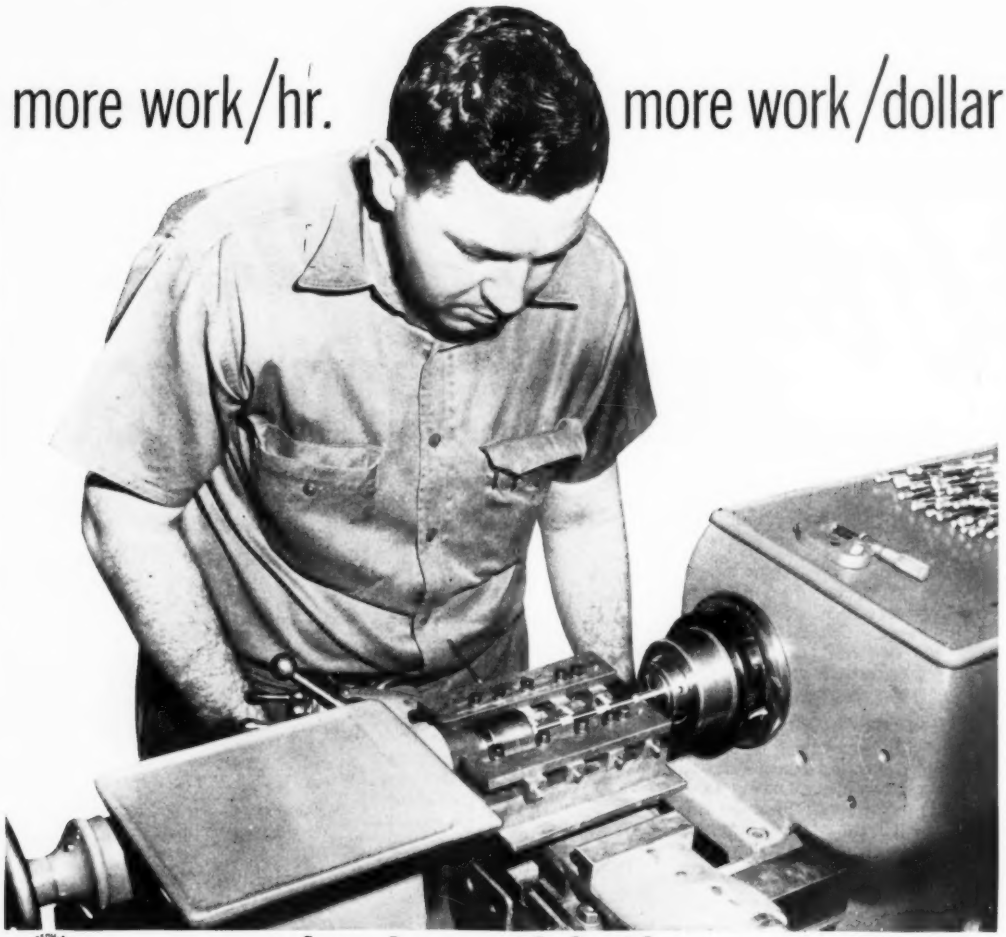
ALLIS-CHALMERS

*Similar design non-ventilated motors Type APK, also available in frames 203 to 224 inclusive.



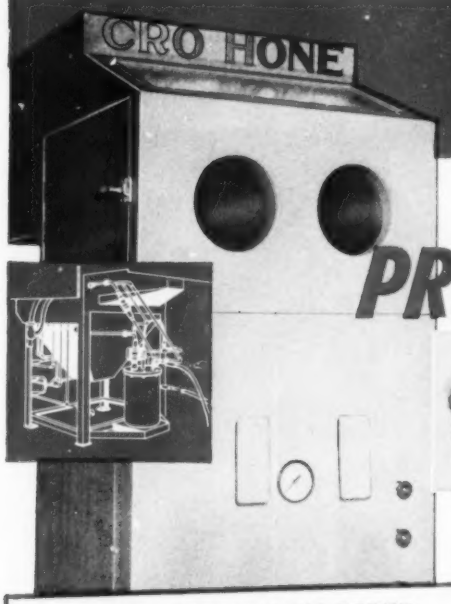
Low initial tool investment, minimum setup time, simple setup changes on a wide variety of jobs, and more work turned out per working day . . . these are the chief reasons why American Lava Corp., Chattanooga, Tenn., bought Cincinnati Tray-Top light duty engine lathes for turning ceramic condensor shafts. Tray-Top proved a sound investment. Mr. R. B. Williams, ceramic engineer, reports: "With a multiple tool block on the lathe compound two or more brass sleeves are turned on the shafts simultaneously. Diameters are easily held within plus or minus half a thousandth. Tray-Tops' low cost saved us substantially on our original investment and are well adapted to our operation." Catalog available on request.

more work/hr. more work/dollar



CINCINNATI 9, OHIO, U.S.A.

cincinnati lathe & tool co.



Pressure Stands for More Profitable Finishing Costs

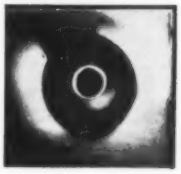
WITH THE NEW CRO-HONE PRESSURE* BLAST

FAST, PRECISE DEBURRING OF INTRICATE PIECES OR PARTS

Here is a steel retaining set screw . . . ½" O.D. with a bad burr and feather condition, before going into the CRO-HONE PRESSURE-BLAST (to the left) . . . here is the same part after 2 seconds blasting time (to the right).

UNIFORM, ACCURATE DESCALING AND SURFACE FINISHING

Half of this 10" plastic brush handle mold was masked to show clearly the removal of the heavy heat-treat scale . . . blasting time 1 minute.



HIGH RATE OF STOCK REMOVAL

To demonstrate the exceptionally high velocity of the CRO-HONE PRESSURE-BLAST, a hole was bored in this piece of ½" plate glass in 38 seconds.

A self contained, easily installed wet-blaster, the Cro-Hone Pressure-Blast not only reduces the cost and labor involved in the cleaning and finishing of metal parts and tools . . . it actually opens up to industry an entirely new metal-working procedure with a wide range of applications.

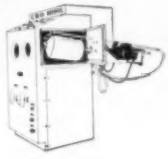
While the technique of wet-blasting is not, in itself, new, the Cro-Hone Pressure-Blast . . . for the first time . . . employs the basic method to its greatest advantage by tremendously increasing the speed of the abrasive slurry as it is forced against the work. The fundamental formula, $E=KV^2$, ["energy, or work produced varies directly as the square of the velocity"] accounts for the effectiveness of the unit.

Despite this increase in speed and effectiveness, the unit operates at normal shop pressures of 80 to 120 p.s.i. and requires only a ½" air connection and ½" water connection.

FOUR MORE HIGH-SPEED PRODUCTION PACKAGES

THE CRO-HONE

Compact wet-blaster for general surface cleaning and finishing procedures.



THE CRO-HONE ROTO-BARREL

Variable speed transmission wet-blaster for high production rate work in bulk.

CRO-HONE, JR

Small, bench model wet-blaster for occasional or experimental work.

THE CRO-HONE ROLLO-TABLE

Cro-Hone Rollo-table for the accommodation of heavy molds and dies.

*Gun nozzle speeds of conventional wet-blasting equipment have been approximately tripled.

Write for all the facts today!

the CRO-PLATE Company, Incorporated
HARTFORD 5, CONNECTICUT

THE CRO-PLATE CO., INC.
Dept. B-3
747 Windsor Street
Hartford 5, Conn.

I am interested in cutting my metal finishing costs.

☐ Please send me Free detailed literature
☐ Please have your representative call on me

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COMPANY _____
ADDRESS _____
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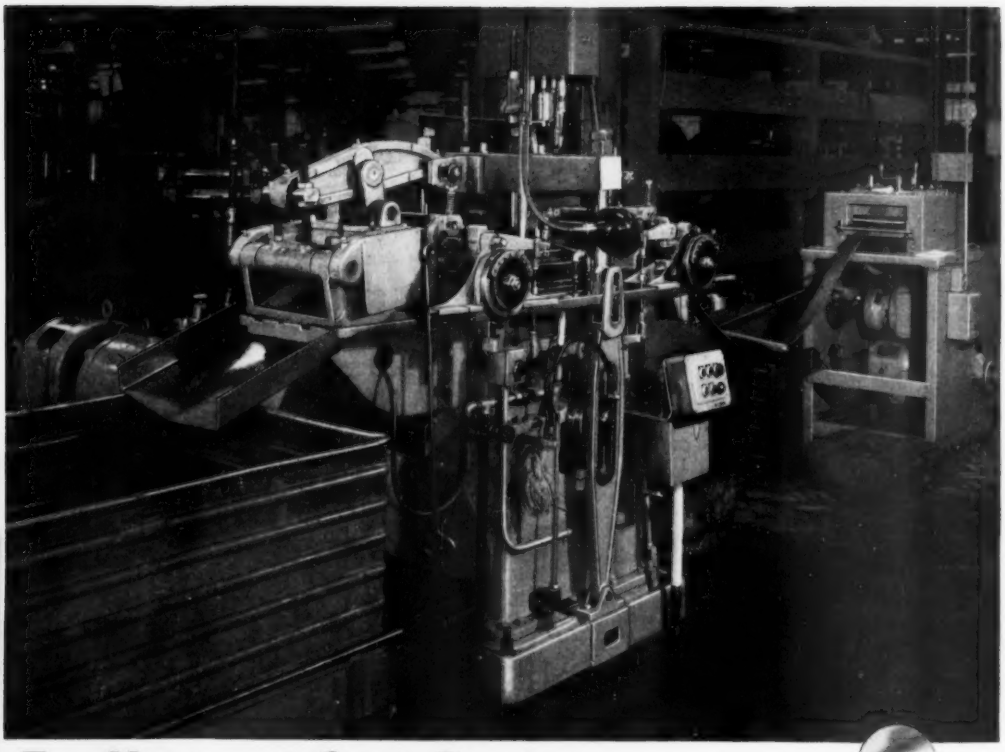
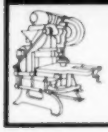


For National Cash Register which uses three sizes of Henry & Wright Dieing Machines to produce 310 different parts. Production rates range from 400 strokes per minute on a 25-ton machine to 80 strokes per minute on a 75-ton machine, with one or more completed parts produced per stroke. You can't beat them for long die life, or versatility. Remember this: because of their unique, revolutionary design, only Henry & Wright Dieing Machines give you both high speed and long die life. It's an unbeatable combination.

Only the best is

OTHER EMHART PRODUCTS INCLUDE:



PREMIUM QUALITY STAMPING PRESSES
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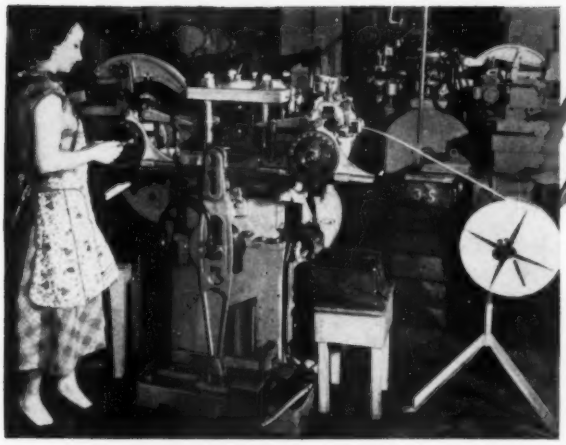
GLASS MAKING MACHINES
HARTFORD-EMPIRE CO.
Division of Emhart Mfg. Co.
HARTFORD 2, CONNECTICUT

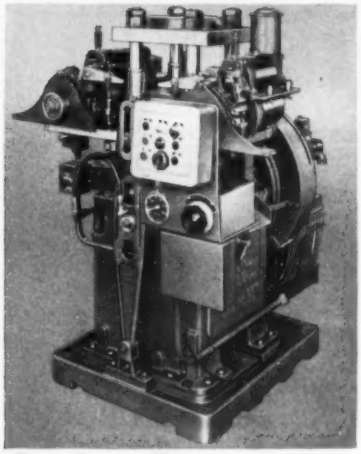
AUTOMATIC PACKAGING EQUIPMENT
STANDARD-KNAPP
Division of Emhart Mfg. Co.
PORTLAND, CONNECTICUT

PLASTIC BOTTLES, RODS, TUBES, SPECIAL SHAPES
PLAX CORPORATION
Subsidiary of Emhart Mfg. Co.
HARTFORD 1, CONNECTICUT

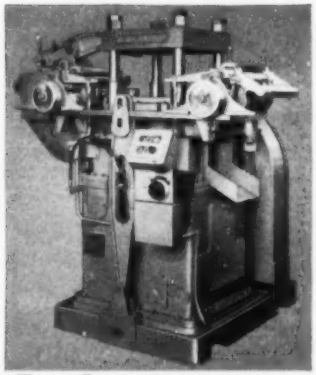


For The Esterbrook Pen

Company which, from the start, has used H. & W. Dieing Machines to produce a wide variety of components for its modern line of fountain pens. Esterbrook selected H. & W. Dieing Machines because of rigidity of lower platen and four-post guide — and their versatility. Stainless steel clips shown here are produced in combination dies which blank, form and mark.



For Link-Belt Company, which uses Henry & Wright Dieing Machines to produce parts for power transmission chain. Here is additional proof that you can depend upon H. & W. machines for speed, precision and sustained efficiency in the production of metal stampings.



For Addressograph-Multigraph

Corporation where complete-per-stroke production on Henry & Wright Dieing Machines keeps production rates high and costs low. Leading companies know they can get the performance they need with Henry & Wright machines.

good enough

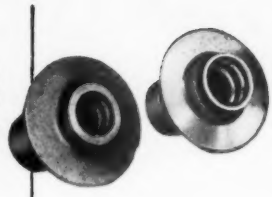
FACT PACKED CATALOG
Complete descriptions of all Henry & Wright Dieing Machines. Write: Henry & Wright, 482 Windsor St., Hartford 5, Conn.

Henry and Wright

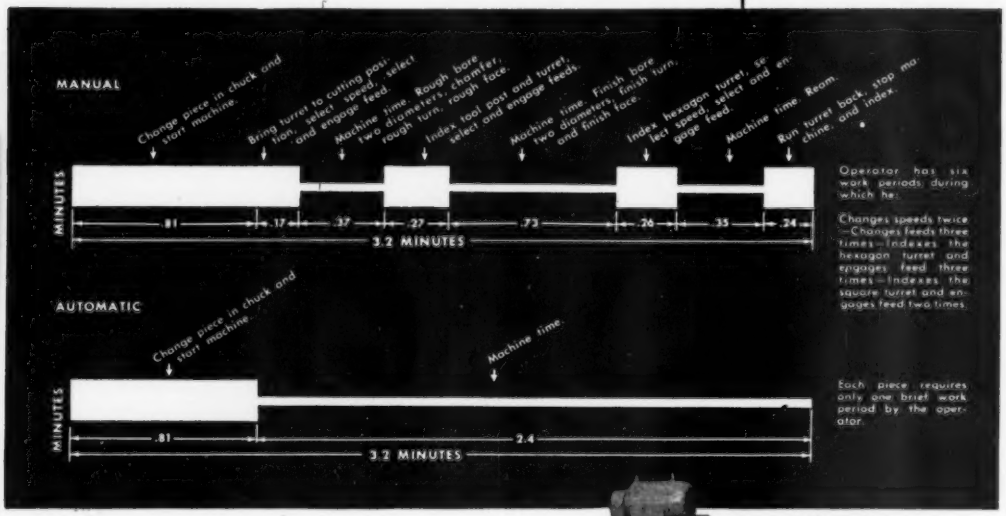
H&W

HENRY & WRIGHT
Division of Emhart Mfg. Co.

how the
GISHOLT FASTERMATIC
saves man-minutes and money!



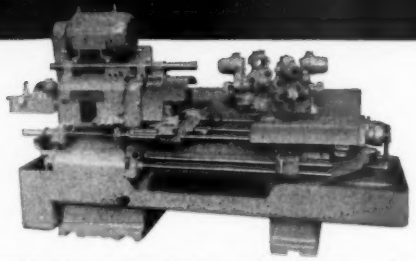
Here is an actual comparison of the time and work cycle of a manually operated turret lathe and a Gisholt Fastermatic Automatic Turret Lathe. The machining of wheel hubs, shown above, requires 6 operations as follows: rough bore, finish bore, ream, rough face, finish face and chamfer. Note that the manually operated machine takes over 54% of the operator's time whereas the Fastermatic takes only 25% of his time, leaving 75% without interruption.


MANUAL
Change piece in chuck and start machine.
Bring turret to cutting position, select speed, select and engage feed.
Machine time. Rough bore, two diameters, chamfer, rough turn, rough face.
Index tool post and turret, select and engage feeds.
Machine time. Finish bore, two diameters, finish turn, and finish face.
Index hexagon turret, select speed, select and engage feed.
Machine time. Ream.
Run turret back, stop machine, and index.
MINUTES
.81
.17
.37
.27
.73
.26
.35
.24
3.2 MINUTES
Operator has six work periods during which he:
Changes speeds twice —Changes feeds three times—Indexes the hexagon turret and engages feed three times—Indexes the square turret and engages feed two times.
AUTOMATIC
Change piece in chuck and start machine.
Machine time.
MINUTES
.81
2.4
3.2 MINUTES
Each piece requires only one brief work period by the operator.

That's the story of the Fastermatic in a nutshell—less work time for the operator. The Fastermatic handles all changes of feeds and speeds automatically.

In this case, for example, the other side of the work piece is done by another Fastermatic with substantially the same cycle. One operator keeps both machines constantly under cut and still has ample time for stacking and work inspection. Important, too, is the fact that both Fastermatics are tended by a comparatively unskilled operator.

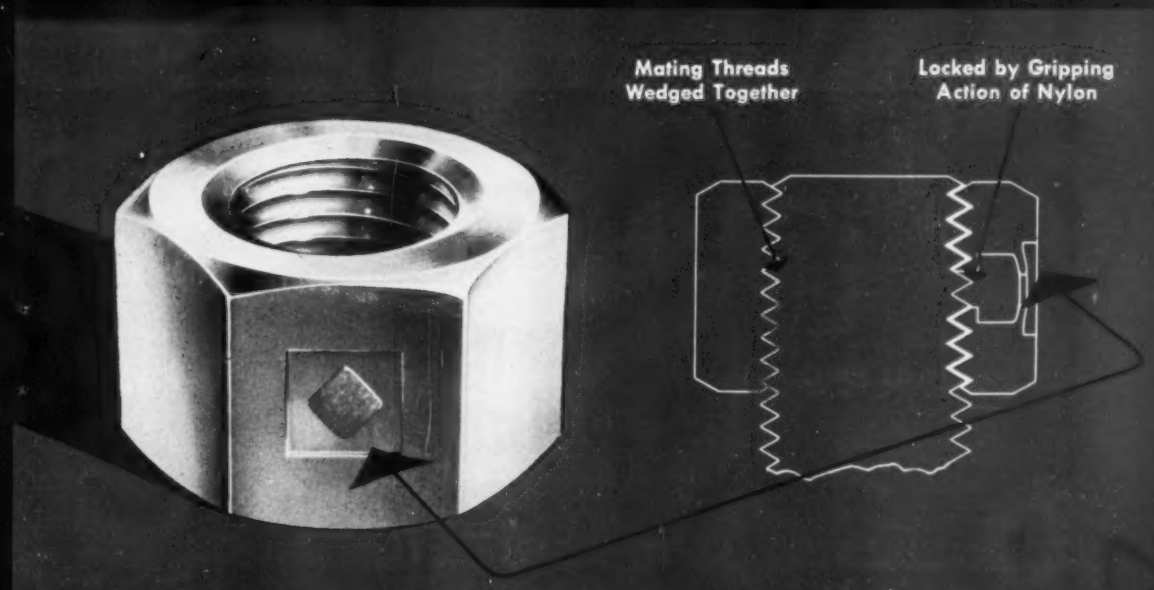
There are many such cases where Fastermatics can cut costs substantially. Gisholt engineers will gladly answer your questions. Write us.

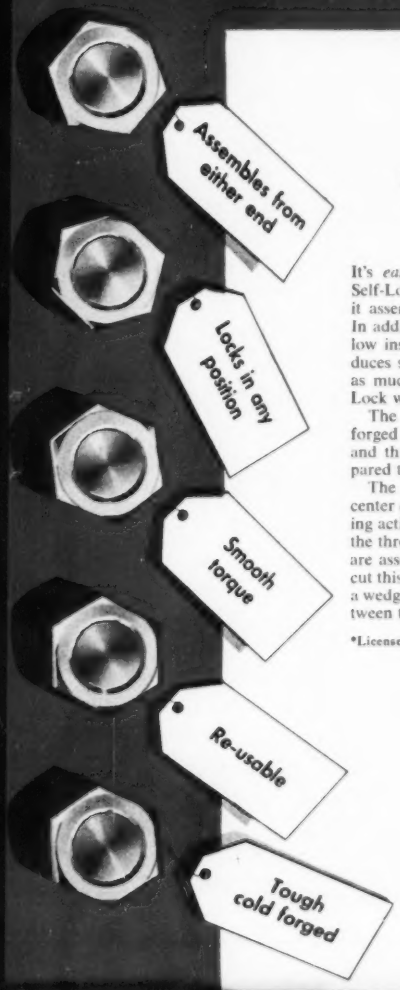


THE GISHOLT 1-F FASTERMATIC—*smallest of 3 different sizes which enable you to machine a maximum number of surfaces in one chucking, handling all changes in speed and feed automatically. On this job, turret was double-tooled so that two parts were completed with each revolution of the turret. Ask for literature.*

GISHOLT MACHINE COMPANY
Madison 10, Wisconsin

THE GISHOLT ROUND TABLE *represents the collective experience of specialists in the machining, surface finishing and balancing of round and partly round parts. Your problems are welcomed here.*





Easy Does It With

Townsend Nylok Locknuts

It's *easy* to install the new Townsend Nylok Self-Locking Nut* as it has no top or bottom—it assembles readily even in blind applications. In addition, you get positive locking action with low installation torque. This saves time and reduces scrap losses due to seizing and galling by as much as 80% over other types of locknuts. Lock washers and jam nuts are eliminated.

The Townsend Nylok Type "E" Nut is cold forged to provide added strength in the body and threads and to save critical material compared to nuts machined from bar stock.

The small nylon plug insert located in the center of one of the hex faces provides the locking action. This plug extends beyond the crest of the threads in the nut and when the nut and bolt are assembled the bolt compresses but does not cut this nylon plug. The nylon plug then reacts as a wedge creating strong metal to metal action between the male and female threads.

*Licensed under The Nylok Corporation patents.

Nylok nuts lock in any position. Seating is unnecessary. Due to nylon's ability to retain its original shape, these nuts can be used again and again. This feature makes it especially desirable in setting adjustment screws. Nylok nuts have high tensile strength, excellent heat resistance and are unaffected by most chemicals.

The Townsend Nylok Locknut is available in American Standard Light (E-6) and Light-Thick (E-7) series—in sizes ¼" through ⅜". It is a suitable companion to Townsend's Tufflok Nut which is a one-piece cold forged nut, with a hexagonal fibre washer as the locking medium. Both locknuts have been highly successful in offsetting vibration and shock. They have back of them Townsend's 135 years of experience in wire drawing and cold heading.

For information on how to save time, eliminate waste and produce better equipment with Townsend Locknuts, write for our locknut bulletin.

Townsend

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Cherry Rivet Company Division, Los Angeles, California

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EDITORIAL IMPACT

makes American Machinist one of the

world's great selling forces*

There's many a reason why . . . year after year . . . advertisers to Metalworking invest the most advertising dollars in *American Machinist*. But none is more important than the simple fact no other metalworking magazine can take your advertising to this industry in the company of such tremendous editorial vitality and IMPACT. We have ample proof of this to offer you:

. . . over 2,000 editorial pages a year . . . written exclusively for, and geared 100 per cent to the job interests of, Metalworking's most powerful buying group: PRODUCTION MANAGEMENT. We will be glad to send you a recent copy of *American Machinist* if you want to see the kind of IMPACT 15 editors can generate when they concentrate on serving PRODUCTION MANAGEMENT exclusively.

. . . a steadily *growing*, all-paid circulation of over 28,000. An important question you may want to ask is why, among all metalworking magazines, *only American Machinist* continues to attract an all-paid circulation. The answer is editorial IMPACT.

. . . the exciting facts about *American Machinist's* proved readership you will find in the *only* Advertising Research Foundation survey of a metalworking magazine. This is research sponsored, conducted, and analyzed by the *only* research organization founded and controlled by *advertisers* like you: members of the ANA and AAAA. And when you are deciding where to concentrate your advertising . . . it's important to remember *only American Machinist* can give you unbiased PROOF of what you are buying in *readership*.

The facts will tell you: when you want to do more business with America's biggest industry . . . concentrate your advertising in *American Machinist*. Why buy less . . . when *only American Machinist* offers you the proved readership of over 28,000 management-concentrated, production-minded men, who are 100 per cent self-elected subscribers to Metalworking's most powerful editorial and advertising force.

*In 1950 *American Machinist* was first in advertising pages among all magazines of less than weekly frequency . . . fourth among all magazines. In the first quarter of 1951, *American Machinist* showed the largest gain in number of advertising pages over 1950's first quarter of any industrial magazine. Source: *Advertising Age*.

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REPLACE With

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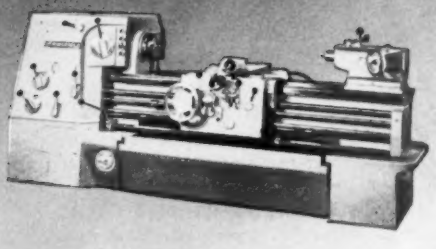
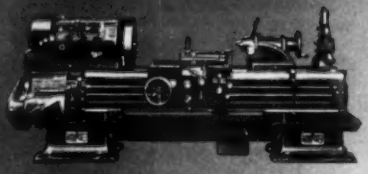
LATHES

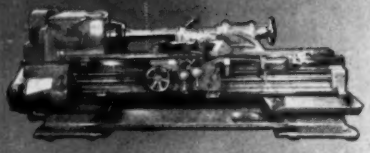
handle a wider range of work—

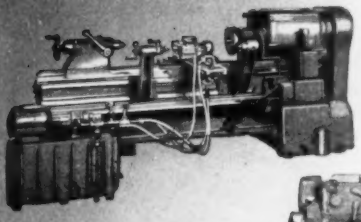
increase output—

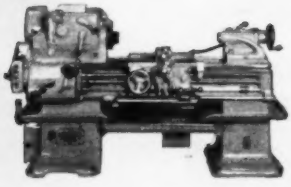
lower operating costs











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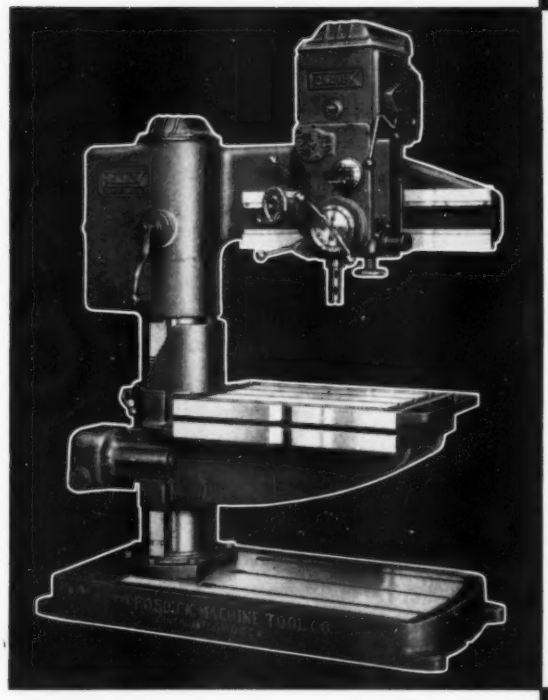
Exclusive Representatives in All Principal Cities

this hole

this hole

or this hole



can be drilled . . . faster, better and at less cost with a . . .

FOSDICK *Sensitive* RADIAL

Yes; for holes up to 1½" in diameter you can't beat the FOSDICK SENSITIVE RADIAL.

Its unique design which combines sensitive drilling with radial construction makes it one of the most versatile drilling machines on the market today.

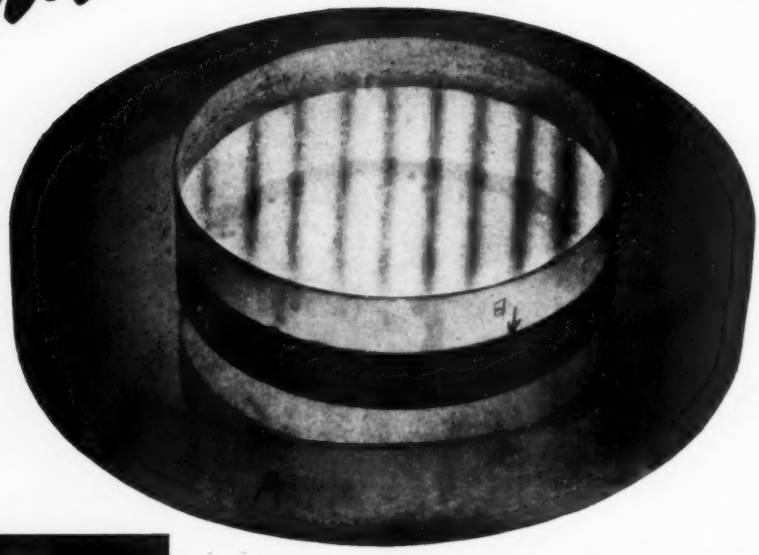
The FOSDICK SENSITIVE RADIAL comes in 3' and 4' sizes . . . Features include a one piece 12" column . . . fixed height arm . . . adjustable table . . . both arm and table swing in a 360° arc . . . the head provides nine speeds and four feeds . . . dials and controls are right at the operator's fingertips.

Write for FOSDICK SENSITIVE RADIAL Bulletin SRA.

FOSDICK
MACHINE TOOL CO.
CINCINNATI 23, OHIO

Van Keuren OPTICAL FLATS
are the proof of Precision

BOSTON



NEW YORK

Detecting worn spot on amplifying gage anvil.

Checking flatness of lapped shoulder on a shaft with a special 3" diameter x 29/32" hole Fused Quartz Optical Flat.

F the 10" diameter Van Keuren Master Flat shown above were extended from New York to Boston, the surface would deviate from a true plane less than 1".

Insist on having Van Keuren Fused Quartz Optical Flats. They are beautifully finished and are of superlative accuracy on both sides. They are the best buy.

CATALOG AND HANDBOOK No. 34

IF YOU HAVE A PROBLEM

of testing flat surfaces, send us a sample part for examination and report.

THIS 208-page volume represents 2 years of research sponsored by the Van Keuren Co.

It presents for the first time in history a simple and exact method of measuring screws and worms with wires.

It tells how to measure gears, splines and involute serrations. It is an accepted reference book for measuring problems and methods.

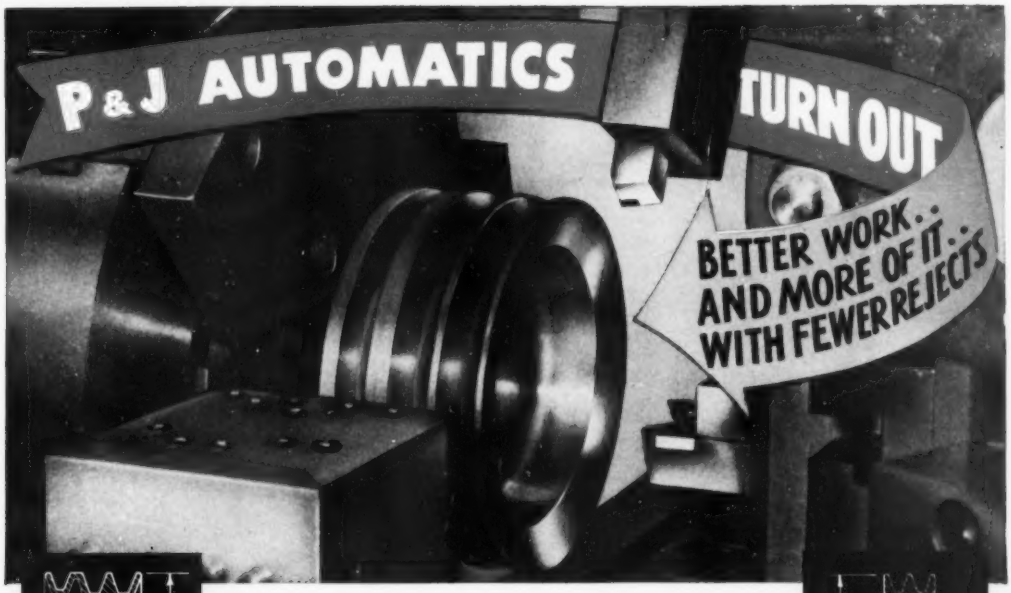
Copies free upon request.

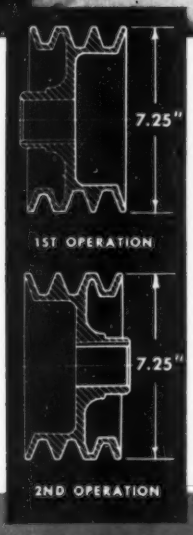
THE Van Keuren CO., 173 WALTHAM STREET, WATERTOWN, MASS.

32nd YEAR

Light Wave Equipment • Light Wave Micrometers • Gage Blocks • Taper Insert Plug Gages • Wire Type Plug Gages • Measuring Wires • Thread Measuring Wires • Gear Measuring System • Shop Triangles • Carboloy Plug Gages • Carboloy Measuring Wires

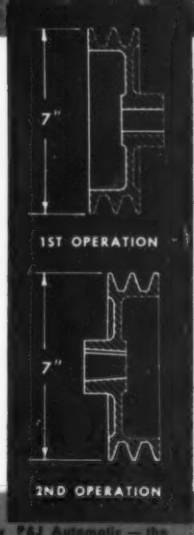
P&J AUTOMATICS TURN OUT BETTER WORK... AND MORE OF IT... WITH FEWER REJECTS

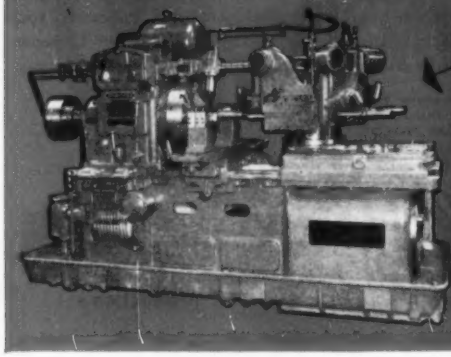


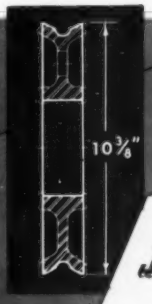


When it comes to machining Pulleys on a precision-production basis, there's no more versatile equipment for the job than P&J Tooling on the P&J Automatic. A single Machine can be tooled efficiently to turn out varied jobs with similar operations — such as roughing and finishing all diameters and flat surfaces . . . boring and reaming holes, whether straight or tapered . . . facing webs and hubs . . . forming radii and grooving sheaves to the precise angles specified. For example: a single combination of P&J Tooling on the 5D Automatic (photo above) mass-produces the two Pulleys illustrated (left and right) in a single setup. Heavy lines indicate surfaces machined.

Whatever the size and class of finish — whether single or multi-grooved — P&J Tooling on the P&J Automatic will give you outstanding production and economy. P&J's more than 50 years' experience proves it . . . so why not send your prints for tooling recommendations and time estimates?







— and here is another P&J Automatic — the 5DS — with a single combination of P&J Tooling set up for precision-machining varied work of similar nature: 5.400" dia. Checking Rings and 7.992" dia. Pistons and (as illustrated) 10.375" dia. single groove Sheaves.

POTTER & JOHNSTON CO.

PAWTUCKET, R. I.

subsidiary of PRATT & WHITNEY

Division Niles-Bement-Pond Company

P&J

MARKS THE SPOT

RELATIVE WORKABILITY of Carpenter STAINLESS STEELS
STANDARD ANALYSIS TABLE
OPERATION
THE CARPENTER STEEL COMPANY READING, PA.

Where *Carpenter* Helps You in Your Work with Stainless

Getting better machined finishes, longer tool life and fewer rejects on Stainless jobs is the answer to—

- **increased production from every shift**
- **more parts from every pound of material**

To make Stainless Steel do its best for you, take advantage of the help Carpenter can provide. We'll be glad to give you personal help in the shop and useful printed information that makes it easier to work with Stainless.

The new Carpenter Stainless Slide Chart quickly gives you information your men need to know. It gives the relative workability for many grades, useful information for jobs where you do *blanking, deep drawing, forging, heading, machining, welding*, etc. You will also find a complete table of information on the physicals for the Stainless grades. Just drop us a note, on your company letterhead indicating your title, and we will put your Carpenter Stainless Slide Chart in the mail for you.

The Carpenter Steel Company, 109 W. Bern St., Reading, Pa.
Export Department: The Carpenter Steel Company, Reading, Pa. "CARSTEELCO".

DON'T WAIT... COOPERATE!
The U.S. Needs Your Steel Scrap. Now.

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STAINLESS STEEL
takes the problems out of production

For Help on Stainless Jobs Call Carpenter. Warehouses in principal cities throughout the country.

Checkmate RISING COSTS!
...WITH SPECIAL
CUTTING TOOLS FROM
NATIONAL TOOL CO.
CLEVELAND 2, OHIO
REPRESENTATIVES IN MAJOR INDUSTRIAL CENTERS

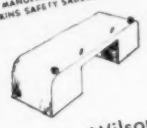
"ALL OUR MONEY BACK IN 62 DAYS"

writes KRW Hydraulic Press customer, George Perkins

GEORGE PERKINS
Electric and Acetylene Welding
1292 FUHRMANN BOULEVARD

ANY METAL
ANY TIME
ANY WHERE

MANUFACTURED OF PERKINS SAFETY SADDLE TANK

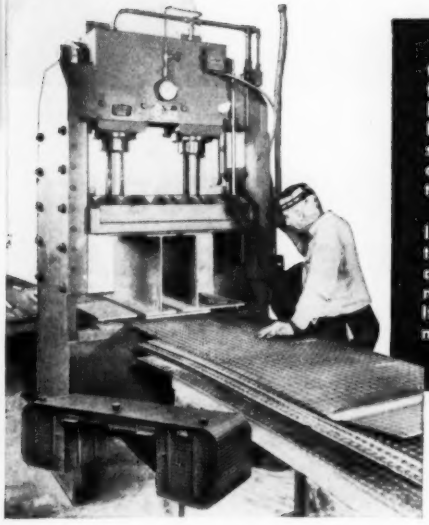


K. R. Wilson,
215 Main St.
Buffalo 3, N. Y.

Gentlemen:

I'm not usually a testimonial writer, but I can't help letting you know what a terrific job my new KRW 100 ton, 2 cylinder hydraulic press has done in my shop. My cost records actually show that this press **paid for itself in just 62 days.** And, believe it or not, I sold almost 9,000 tanks in 1950 without a single return or complaint.

Sincerely yours,
George Perkins
Perkins Welding Co., Buffalo, N. Y.



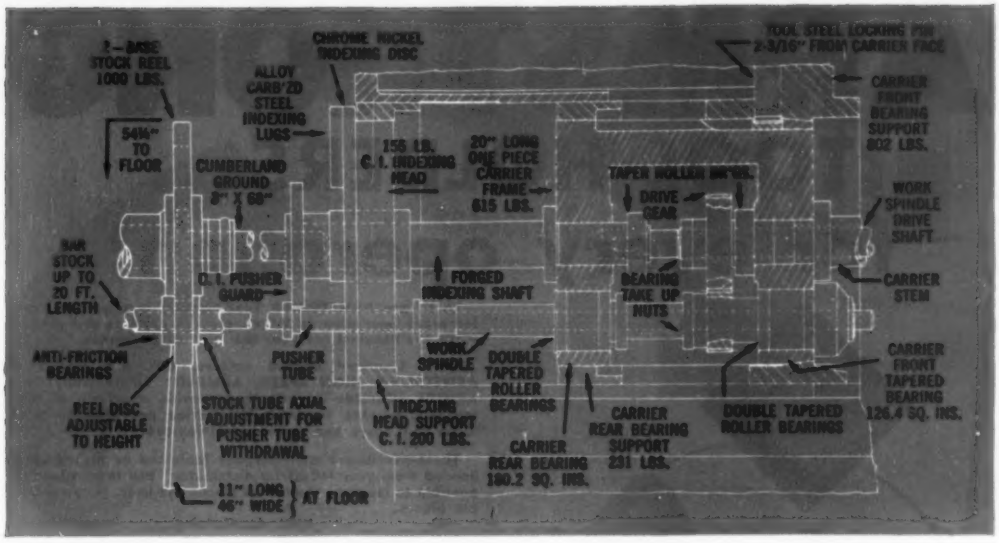
Mr. Perkins makes steel saddle tanks for big trailer trucks. They hold 125 gallons of gas, obviating the need for frequent stops to fill up. KRW engineers showed Mr. Perkins how to save time and cut production costs by forming and bending these tanks with a KRW hydraulic press. They also showed him how to form stiffening ribs on the tanks instead of the welded angle stiffeners he was using. Results? The tanks are now 60% stronger.

KRW Hydraulic Presses can do the same for you on literally hundreds of manufacturing jobs. Available in 25-150 ton capacities, they're entirely above ground. Hand operated, air operated or motor driven. One, two and three cylinder models. First investment is low, operating costs still lower. If you need a specially-built press, our engineering department will "tailor-make" one to your needs.

Ask your machinery dealer to quote you, or write Dept. 11

K·R·WILSON

215 MAIN STREET • BUFFALO 3, N.Y.


1—BASE STOCK REEL 1000 LBS.
CHROME NICKEL INDEXING DISC
TOOL STEEL LOCKING PIN 2-3/16" FROM CARRIER FACE
ALLOY CARB'ZD STEEL INDEXING LUGS
CARRIER FRONT BEARING SUPPORT 802 LBS.
54¼" TO FLOOR
CUMBERLAND GROUND 8" X 68"
156 LB. C. I. INDEXING HEAD
20" LONG ONE PIECE CARRIER FRAME 615 LBS.
TAPER ROLLER BEARINGS
DRIVE GEAR
WORK SPINDLE DRIVE SHAFT
BAR STOCK UP TO 20 FT. LENGTH
C. I. PUSHER GUARD
FORGED INDEXING SHAFT
BEARING TAKE UP NUTS
CARRIER STEM
ANTI-FRICTION BEARINGS
PUSHER TUBE
WORK SPINDLE
DOUBLE TAPERED ROLLER BEARINGS
CARRIER FRONT TAPERED BEARING 126.4 SQ. INS.
REEL DISC ADJUSTABLE TO HEIGHT
STOCK TUBE AXIAL ADJUSTMENT FOR PUSHER TUBE WITHDRAWAL
INDEXING HEAD SUPPORT C. I. 200 LBS.
CARRIER REAR BEARING 180.2 SQ. INS.
CARRIER REAR BEARING SUPPORT 231 LBS.
DOUBLE TAPERED ROLLER BEARINGS
11" LONG 46" WIDE AT FLOOR

FIRST THINGS COME FIRST

Upon the Spindle Carrier of an "Automatic" falls the responsibility of accurately presenting and holding the work to — and in contact with — the tools. The basic design of the Carrier is obviously of first importance in the protection of the work spindles from the strain of heavy cuts and weight of the bar stock. Then, in proportion to the Carrier's ability to handle the full load is the importance of any supplementary facility that shares the load.

1. **The 1½" Six Spindle CONOMATIC CARRIER gives better support to the work spindles under heavy loads.**

The thick, heavy ribs resist strain. The tapered front bearing and the spindle drive gears are within 3" and 9¼", respectively, of the collet faces. The wider spaced bearings give better alignment and load distribution. The Carrier is free of Cross Slide positive stop pressure.

2. **The entire INDEXING MECHANISM is supported by the Top Bed as well as the Base. There are fewer wearing parts.**

The Indexing Head takes the brunt of the indexing load. It is supported by the short frame member midway between the Carrier and the Stock Reel. It is joined to the latter by strong center shafts.

3. **The STOCK REEL is designed to handle longer and heavier loads.**

The two Stock Reel Bases are independent of the machine and relieve it of the heaviest part of the bar load during the cutting and indexing movements. Adjustable alignment gives freer stock-feed action.

Buyer's Comparison Chart will guide you to full information

A Comparison of ALL Automatics is in Favor of Cone

6 Conomatic

CONE AUTOMATIC MACHINE COMPANY, INC.
WINDSOR, VT., U.S.A.

ARMSTRONG
TOOL HOLDERS...
for every operation!

There are ARMSTRONG Tool Holders in sizes and types for every operation on lathes, planers, slotters and shapers —for the heaviest cuts; for the most delicate cuts.

With Standard shaped cutters, bits and blades of ARMSTRONG HIGH SPEED, ARMALOY (Cast Alloy) and ARMIDE (Carbide-Tipped) they provide a system of tooling that assures maximum production per machine hour, lower tool costs, and higher machining profits.

These permanent multi-purpose tools can be picked up as needed from your industrial distributor. Use them wherever possible to increase number of pieces per hour, to lower cost per pieces.

Write for Catalog.

ARMSTRONG BROS. TOOL CO.

"The Tool Holder People"

5215 W. Armstrong Ave. Chicago 30, Ill.

READ THIS LETTER FROM A TYPICAL "E" STEEL CUSTOMER

J&L STEEL

check these points

Screw Products Comp
INC.

...ttle
...& Laughlin Steel Corporation
...S & Laughlin Building
...ttsburgh, Pa.

Dear Sir:

We regret having been so slow in replying to your recent letter, but will attempt to give you some of the information for which you requested in regards to our experience with J&L E-33 steel.

We used a 1" R.A.6 Acme Gridley Automatic Screw Machine; the indexing time is approximately 1 second.

We are making a small Hub which is Drilled, Co. Bored, Formed and Tapped, but the time of the operation is limited to the time required to Drill and Co. Bore. We use a 5/16" cam on the tool slide for this operation.

✓ Stock size is 5/8" Rd. on B-1113 C.R.S. We ran 1300 R.P.M. and used a feed of .003" per revolution.

On E-33 steel we were able to run 1800 R.P.M. and use a feed of .0035" per revolution, which resulted in a net savings of 2 seconds per piece or 33%.

✓ At this speed on the E-33 C.R.S. we found the finish on the part to be better, the tool life longer by approximately 50% which greatly reduced our down time for tool changes and reduced our rejections as well.

✓ We took the job during a period when things were very competitive and work was scarce, and actually took this work on almost a break even basis, with our cost based upon using B-1113 C.R.S. But when we started using the E-33 C.R.S., we found that instead of having a dollar trading job on our hands we had converted it into a very good piece of business indeed.

✓ We have also used this E-33 steel on various other parts in sizes ranging from 1/4" dia. to 2 11/16" dia. and it is our opinion that, if the full advantage of the increased machinability is taken, the savings obtained more than offsets the increased costs of this type material even in the larger sizes.

In closing we have only one serious complaint to register and that is, why isn't there more of it available?

Very truly yours,

AMERICA NEEDS SCRAP TO MAKE MORE STEEL

You can get real economies too by using J&L "E" Steel. Send for a free copy of our book, "A Progress Report on 'E' Steel." It lists grades available, physical properties and tells how others have used free-machining "E" Steel to advantage.

J&L "E" STEEL IS EASILY IDENTIFIED BY THE DISTINCTIVE BLUE COLOR ON THE END OF EVERY BAR.

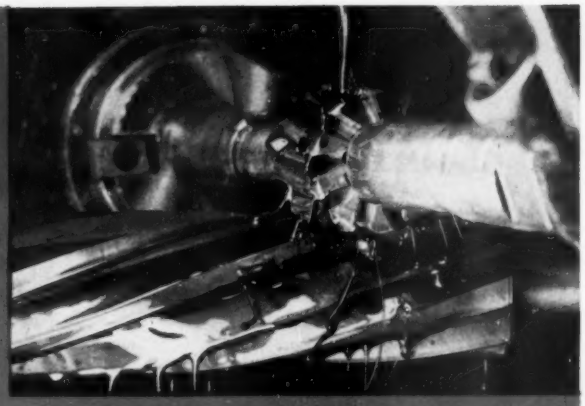
JONES & LAUGHLIN STEEL CORPORATION

402 JONES & LAUGHLIN BUILDING PITTSBURGH 30, PA.

From its own raw materials, J&L manufactures a full line of carbon steel products, as well as certain products in OTISCOLOY *and* JALLOY *(hi-tensile steels).*

PRINCIPAL PRODUCTS: HOT ROLLED AND COLD FINISHED BARS AND SHAPES • HOT AND COLD ROLLED STRIP AND SHEETS STRUCTURAL SHAPES • TUBULAR, WIRE AND TIN MILL PRODUCTS • "PRECISIONBILT" WIRE ROPE • COAL CHEMICALS

PRATT & WHITNEY MILLING CUTTERS



SPEND LESS TIME IN THE GRINDING ROOM ...WORK MORE HOURS PER DAY

Consequently they produce more per man (or per machine) and simultaneously effect savings in stopped-time and service grinding . . . important factors in today's program of production for defense.

What's the reason? Pratt & Whitney's all-inclusive and exacting control of design, materials, manufacture, heat treatment and surface finish . . . based on knowledge and experience gained from serving the metal cutting industry for more than 90 years.

With P&W cutting tools, *you'll* get performance that pays off with lower costs as a result of longer tool life, better work and more of it, with greater accuracy. Order them with confidence — any size, any shape — from your nearby Pratt & Whitney Branch Office.

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P&W MILLING CUTTERS
—important factors in today's Production for Defense

HARDINGE-SJOGREN

HARDINGE
ELMIRA, N.Y.

SPEED

Collet Chucks with HARDINGE STEEL COLLETS

Available in Five Sizes:
1", 1⅜", 1¾", 2¼", and 3½" collet capacity.

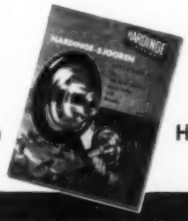
for Accuracy and Durability at Low Cost

When you order Hardinge-Sjogren Chucks and Hardinge **Steel** Collets you get all these advantages:

1. Complete Capacity for Hexagon and Square as well as Round.
2. Lowest Initial Cost.
3. Longest Service Life.
4. Grips both **short** and long lengths properly.

. . . . . and HARDINGE tempered steel collets assure you of quick release, sustained accuracy and durability.

Write for Bulletin 8— complete information on

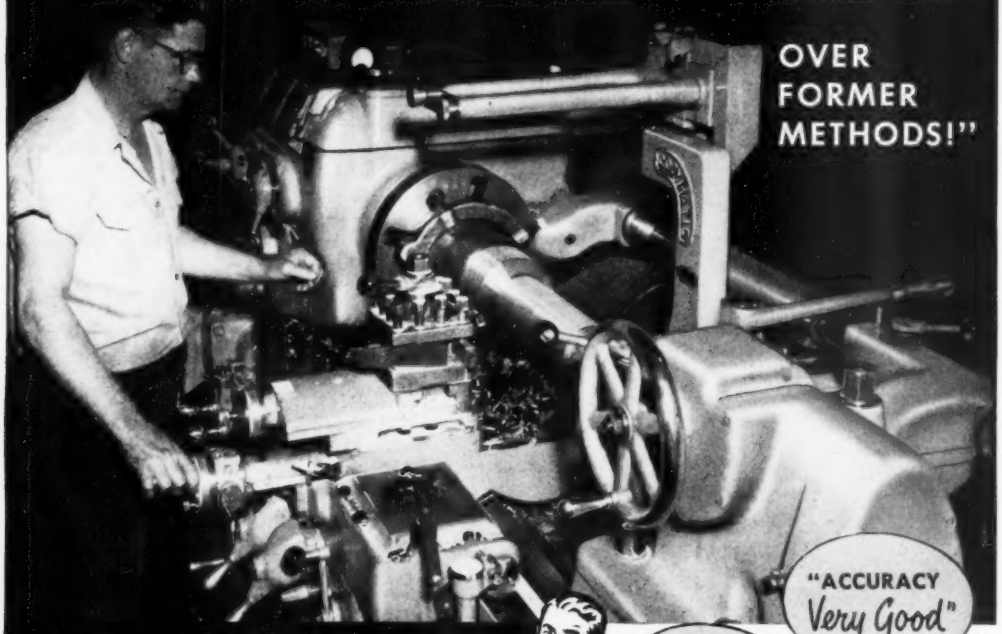


HARDINGE-SJOGREN Chucks and Collets.

HARDINGE BROTHERS, INC., ELMIRA, N. Y.

"PERFORMANCE HAS ESTABLISHED LEADERSHIP FOR HARDINGE"

"25 to 40% Time Saved... OVER FORMER METHODS!"



Harnischfeger Corp. says
MILWAUKEE, WISCONSIN

"ACCURACY Very Good"

"OUTPUT Tops"

"VERSATILITY Very Good"

"DESIGN FEATURES Excellent"

"Like them very much"

OF ITS LODGE & SHIPLEY

COPYMATIC LATHE

In a series of case history advertisements, owners have told you how their Lodge & Shipley Copymatic Lathes are saving time and money, giving far better performance.

In every case Copymatic owners report notable time savings, ranging up to as much as 70%! Here, Harnischfeger Corp., a noted crane, hoist and heavy equipment manufacturer obtains a 25-40% savings.

In the illustration, a pinion shaft for an excavator is being turned before heat treating. At 160 surface fpm, the carbide tool is being fed at .018" per revolution, taking a heavy ⅝" hogging cut on an SAE 4140 steel shaft.

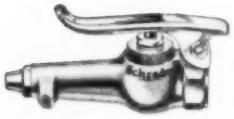
COPYMATICS are profitable producers for almost any size shop. Write for a set of Copymatic Case Histories and Bulletin No. 675.

THE Lodge & Shipley COMPANY
MACHINE TOOL DIVISION • 3059 COLERAIN
CHOREMASTER DIVISION • 800 EVANS ST.
CINCINNATI 25, OHIO

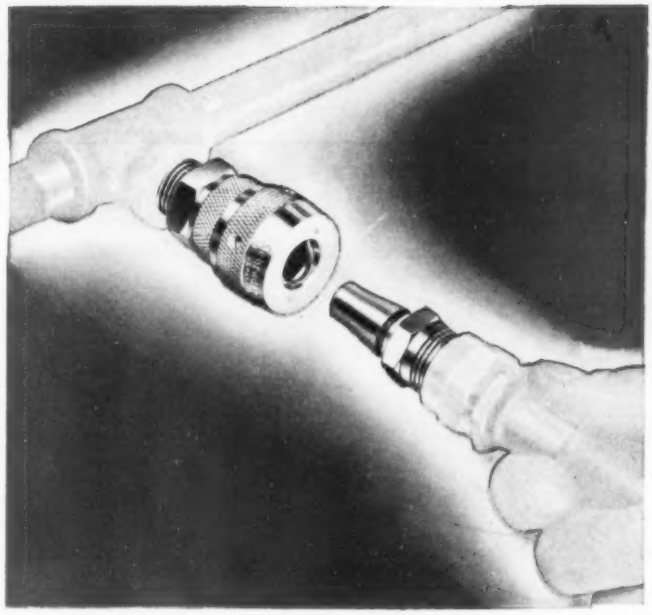
There is a Schrader® blow gun for every job

This drop forged stainless steel blow gun is designed to stand up under hard, steady use. It is practically indestructible. The stainless steel construction increases corrosion resistance and gives you a positive guarantee of longer, trouble-free service.

Button Type—This sturdy all-purpose forged brass blow gun operates at the press of a button. A popular all-round blow gun that has proved indispensable to hundreds of thousands of users.



Lever Type—A controlled flow of air, from a puff to a blast, is a feature of this precision-control blow gun. Its design and lever position provides a natural grip for thumb control of air flow.



Now Compressed Air can be as convenient as electricity

With Schrader Quick Acting Couplers you can have air where you want it and when you want it—with the "plug-in" convenience of electricity. They can be installed at handy places along walls, benches or columns . . . bringing air right to the "point of work."

A quick push snaps the Schrader swivel adapter into the check unit . . . opens line pressure and locks to make an air-tight connection. It requires only a positive manual twist of the check unit sleeve to uncouple. These fittings come in a variety of adapter and thread sizes.

The Schrader Tuck-Away Hose Reel is another item for more convenient

handling of compressed air. This reel will keep air lines off the floor, reduce accidents, lengthen the life of the hose. Schrader Hose Reels are the efficient way to bring air to the work.

These are just two of the many Schrader air line fittings that can help you make air as convenient to use in your shop as electricity. Ask us to help you determine what will best fit *your* needs. Send us a letter outlining your particular installation, your idea, or fill out the coupon below.

Mail this Coupon Today

Air Cylinders • Operating Valves • Press & Shear Controls • Air Ejection Sets • Blow Guns • Air Line Couplers • Air Hose & Fittings • Hose Reels • Pressure Regulators & Oilers • Air Strainers • Hydraulic Gauges • Uniflare Tube Fittings

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PRODUCTS
CONTROL THE AIR

A. Schrader's Son
Division of Scovill Manufacturing Company, Incorporated
460 Vanderbilt Avenue, Brooklyn, N. Y., Dept. F-6

Please send me further information on Schrader Air Line Fittings and Blow Guns.

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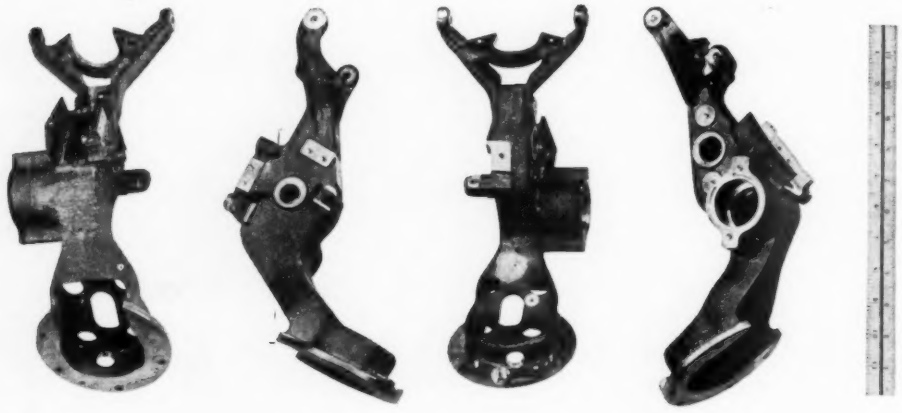
Hole Location Practices

Published in the interests of greater accuracy and quality in the toolroom and on the production line by the Moore Special Tool Company, Inc., 738 Union Avenue, Bridgeport 7, Conn., builders of Jig Borers, Jig Grinders, Panto-Crush Wheel Dressers, Die Flippers, Motorized Centers and a complete line of Hole Location Accessories.



Take a good look at this precision part. It's magnesium, and has a total of 31 holes—some bored, some tapped, and 2 large ones recessed. There are 20 separate milling cuts. In addition, the base and the bevel on base are turned. All these faces and holes are held to 0.0005". Imagine how many operations it would take, the number of different machines needed, and the time expended in producing 100 of these parts.

THE COMPLETE JOB WAS DONE ON THE MOORE JIG BORER in a fraction of the time required by other means. One simple block fixture was used to hold the part around the base for all operations. Using the Moore micro-sine table and parallel set-up blocks, only 11 set-ups were necessary.

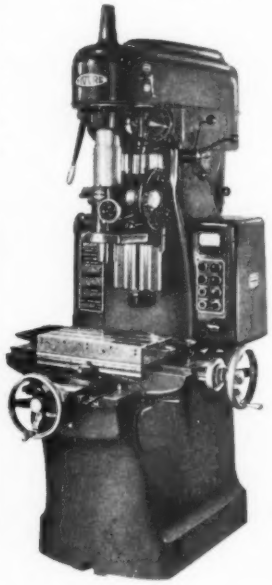
The speed, accuracy and simplicity of operation of the Moore Jig Borer are the results of a combination of time-proven features, including hardened, ground and lapped lead screws for precise, rapid table settings within .00015" by coordinate location; infinitely variable spindle speeds—push-button controlled—from 75 to 2400 RPM; three power-feed ratios—.0015", .003" and .006"—per revolution of spindle in either direction; centralized control panel; disconnect clutch for easy indicating and totally enclosed drive mechanism.

Write for the new 24-page No. 2 Jig Borer catalog, which contains complete design specifications, describes Jig Borer accessories and gives further examples of Jig Borer jobs—in the toolroom and on the production line.

VALUABLE BOOK FOR DEFENSE PLANT TRAINING

PRECISION HOLE LOCATION contains many examples of jig-boring and jig-grinding practices similar to one described here. 448 pages, 400 illustrations. Over 7500 copies of this authoritative book have been sold to date. 184 pages of Woodworth Coordinate Location Tables from 3 to 100 holes. Available at special price of $3 in U.S.A., $3.50 elsewhere. Send check or money order to Moore Special Tool Co., Inc., Bridgeport 7, Conn.

No. 2 Moore Jig Borer
Table Working Surface of 10" x 19"; Accurate lead screws; infinitely variable spindle speeds, 75 to 2400 R.P.M.; 3 power feed ratios.



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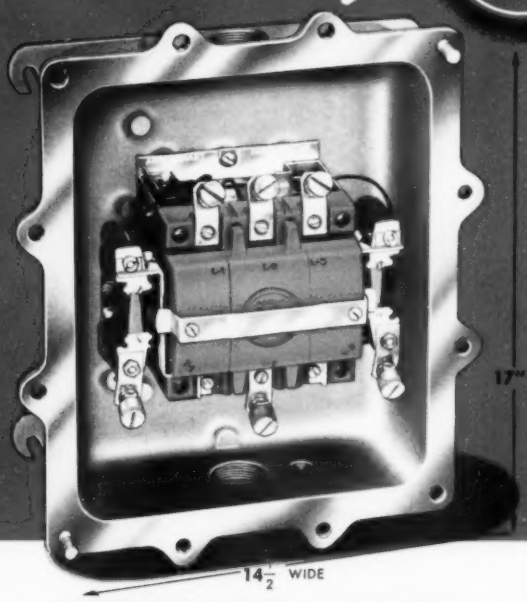
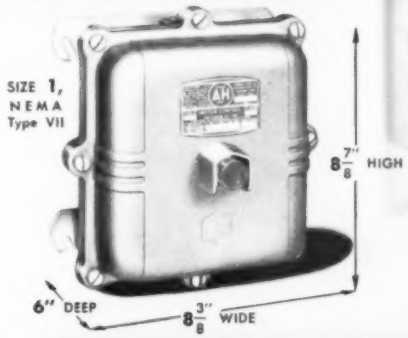
MOTOR STARTER LINE
FOR USE WHEREVER
HAZARDOUS CONDITIONS EXIST



- *2/3* the SIZE
- *2/3* the WEIGHT
- SUPERIOR PERFORMANCE
- HIGHEST RESISTANCE to CORROSION
- STARTER and CONTACTOR SIZES 0, 1, 2, 3, 4

COMPLETE LINE •• UNIFORM DESIGN

Wherever hazardous conditions exist, specify and buy the finest motor control for machinery and equipment — EXPLO-SAFE MOTOR STARTERS by ARROW-HART. In a new, improved cast Feraloy enclosure, these "RA" Magnetic Starters, acclaimed by design-engineers, manufacturers and electricians alike for outstanding performance, are now available in NEMA Type VII, Class I, Group D; Type IX, Class II, Groups E, F, G; and Type IV. Consider these important features — (1) Feraloy housings, possessing high tensile strength and unusual resistance to corrosion, are cast of a special alloy by Crouse-Hinds. (2) Just 2/3 the size of outmoded solenoid type starters. (Compare dimensions listed on reverse side.) This means new opportunities in layout and more compact control centers. (3) Just 2/3 the weight is welcomed by installation and maintenance crews. (Compare weights on next page.) Accumulated floor load is materially reduced. (4) Right Angle design innovations combined with alkyd hood and base assure full protection. For additional information note EXPLO-SAFE folder offer and product data on following page.



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APPROVED BY THE UNDERWRITERS' LABORATORIES

THE ARROW-HART & HEGEMAN ELECTRIC CO.
HARTFORD CONNECTICUT

BRANCHES AND WAREHOUSES IN PRINCIPAL CITIES

ELECTRICAL CONTROL

ARROW AH HART

ESTABLISHED IN 1890

ELIMINATE COSTLY INSTALLATION PROCEDURE

INSTALLING SIZE 2 EXPLO-SAFE STARTER

PROVIDE MAXIMUM SAFETY WITH

EXPLO-SAFE©

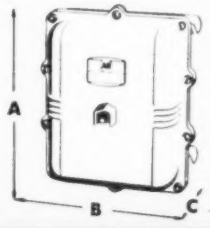
COMPLETE LINE OF MOTOR CONTROLS FOR OUTSTANDING PERFORMANCE IN

HAZARDOUS LOCATIONS

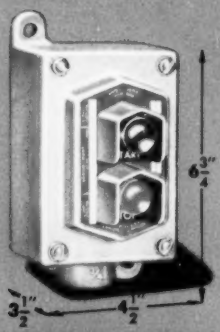
SMALL IN SIZE ***LIGHT IN WEIGHT***

There's increased protection for hazardous locations with Arrow-Hart's new EXPLO-SAFE and Weatherproof Magnetic Starters . . . a complete line of uniform design available in NEMA Type VII (Explosive Gas), Type IX (Explosive Dust) and Type IV (Weatherproof). There's superior performance, too, in the "RA", Right Angle, operating mechanism . . . a revolutionary design that accounts for 2/3 reduction in size and weight. Straight-thru front wiring . . . simple parts replacement with ample working space . . . make these starters easier, less costly to install and service. Heavy-duty contacts; simple, sturdy construction; guided-alignment — all combine to give you long, dependable service in the smallest motor starter line on the market.

COMPARE WITH MOTOR STARTERS NOW EMPLOYED



ARROW-HART EXPLO-SAFE PUSH BUTTON STATIONS



In hazardous locations for circuits up to 600 volts A.C. maximum. Push Buttons are available in variety of arrangements and contact requirements. Rotary type selector switch provides 2 or 3 position operation. Pilot lights with colored lenses also available. Stations custom assembled from stock parts for your specific needs.

TYPE 27907-E

DIMENSIONAL AND WEIGHT DATA FOR ACROSS-THE-LINE STARTERS

SIZE	A—HEIGHT	B—WIDTH	C—DEPTH	TOTAL WEIGHT (lbs.)
	Dimensions In Inches			
NEMA Type VII, Class I, Group D, Explosive Gas and Vapors				
0	8 7/8	8 3/8	6	18
1	8 7/8	8 3/8	6	18
2	14 1/8	11 5/8	7 9/16	59
3	17	14 1/2	9 1/8	106
4	23	17 7/8	11	233
NEMA Type IX, Class II, Groups E, F, G, Explosive Dust, Fibers and Flyings				
0	8 7/8	8 3/8	5 5/8	14
1	8 7/8	8 3/8	5 5/8	14
2	13 3/4	11 3/16	6 3/4	34
3	15 3/4	13 5/16	8 3/16	52
4	22	17	9 3/4	132
NEMA Type IV, Weatherproof				
0	8 7/8	8 3/8	5 5/8	14
1	8 7/8	8 3/8	5 5/8	14
2	13 3/4	11 3/16	6 3/4	34
3	15 3/4	13 5/16	8 3/16	52
4	22	17	9 3/4	132

APPROVED BY UNDERWRITERS' LABORATORIES

WRITE TODAY—FOR COMPLETE ENGINEERING DATA ON EXPLO-SAFE STARTERS

ARROW-HART

THE ARROW-HART & HEGEMAN ELECTRIC COMPANY
103 HAWTHORN STREET
HARTFORD 6, CONNECTICUT, U.S.A.

Branches in: BOSTON, CHICAGO, CLEVELAND, CINCINNATI, DALLAS, DENVER, DETROIT, LOS ANGELES, NEW YORK, PHILADELPHIA, SAN FRANCISCO, SYRACUSE. In Canada: ARROW-HART & HEGEMAN (CANADA) LTD., MT. DENNIS, TORONTO

PRINTED IN U.S.A.

It pays to specify UNIVERSAL bushings because only UNIVERSAL bushings have all these important features

super finish reduces wear to a minimum

blended radius reduces tool hang-up

100% concentricity and hardness tests assure accuracy

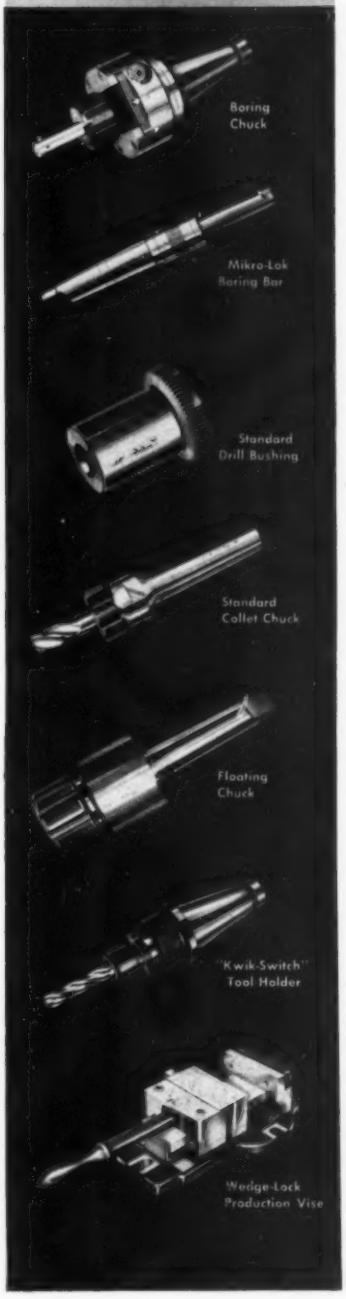
knurled head provides quick sure grip

complete variety of sizes and lengths

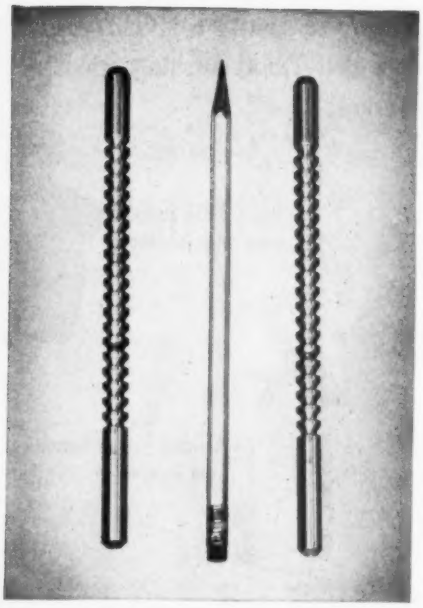
UNIVERSAL ENGINEERING COMPANY
FRANKENMUTH 1, MICHIGAN

151

OTHER UNIVERSAL PRODUCTION TOOLS



Perhaps your job calls for a big, husky, man-sized broach like this 76" involute spline broach, built for a leading gear manufacturer.



. . . or maybe you use small broaches . . . like these, for broaching automotive ignition parts.

precision QUALITY in any QUANTITY with American ENGINEERED Broaches

Write today for your copy of Catalog No. 450, 32 pages packed with useful, practical broaching information.

Big. Small. Short. Tall. Two, 200 or 2,000 at a time. When American builds broaches, you can count on this:—A standard of precision that will consistently give you top economy in production . . . a quality that delivers a maximum number of parts between resharpenings . . . and a maximum number of resharpenings for longer broach service life. You can expect these advantages with American-engineered broaches. You get them because American gives you more than twenty-five years experience with broaches, fixtures and machines . . . twenty-five years of close cooperation with manufacturers. Knowing all three, they can engineer to get the most, production-wise, from all three. Why not present your next broaching problem to American for a profitable solution? Send part print or sample and hourly requirements for their obligation-free recommendations. Address Dept. A.

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A DIVISION OF SUNDSTRAND MACHINE TOOL CO.

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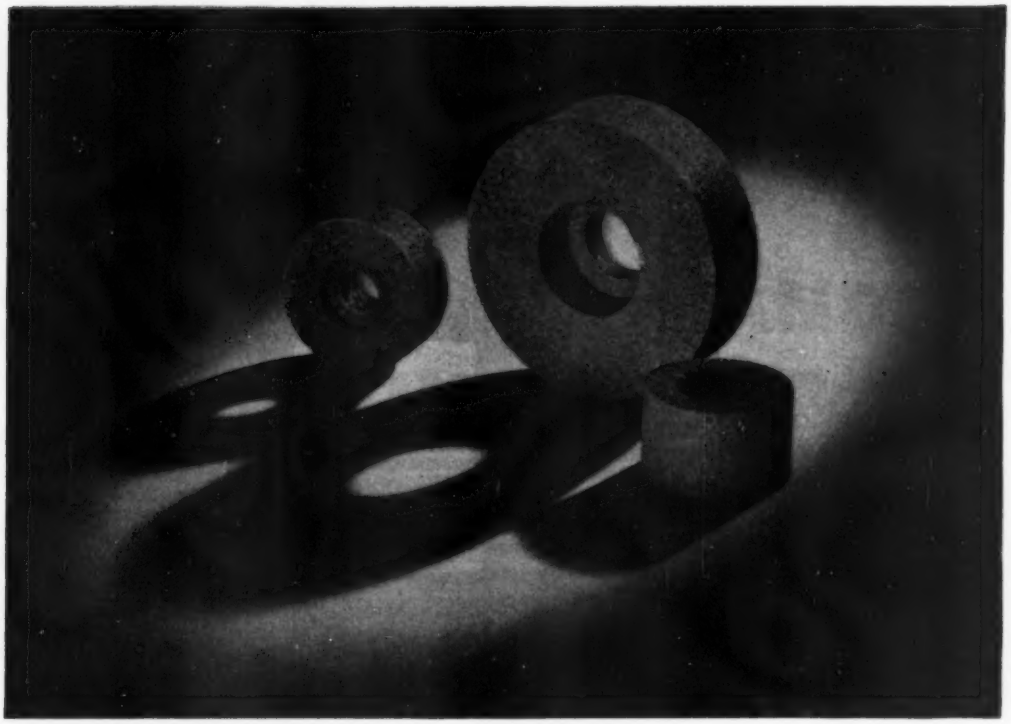
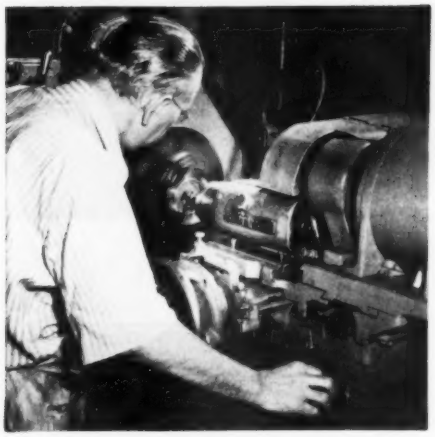
See American First — for the Best in Broaching Tools, Broaching Machines, Special Machinery





Cuts fast, free, cool...

High production rates and a free, cool cut are outstanding features of V1 Bond Internal Grinding Wheels by CARBORUNDUM. You'll see money saved through excellent form holding qualities which lengthen wheel life through reduced and uniform compensation for wheel wear, requiring fewer machine adjustments during a run. V1 Bond Wheels are being applied effectively to a wide range of internal production grinding. Minimum number of grades required simplifies stocking problems. Many other advantages. See your CARBORUNDUM representative, or write Dept. AM 81-10.

Only CARBORUNDUM

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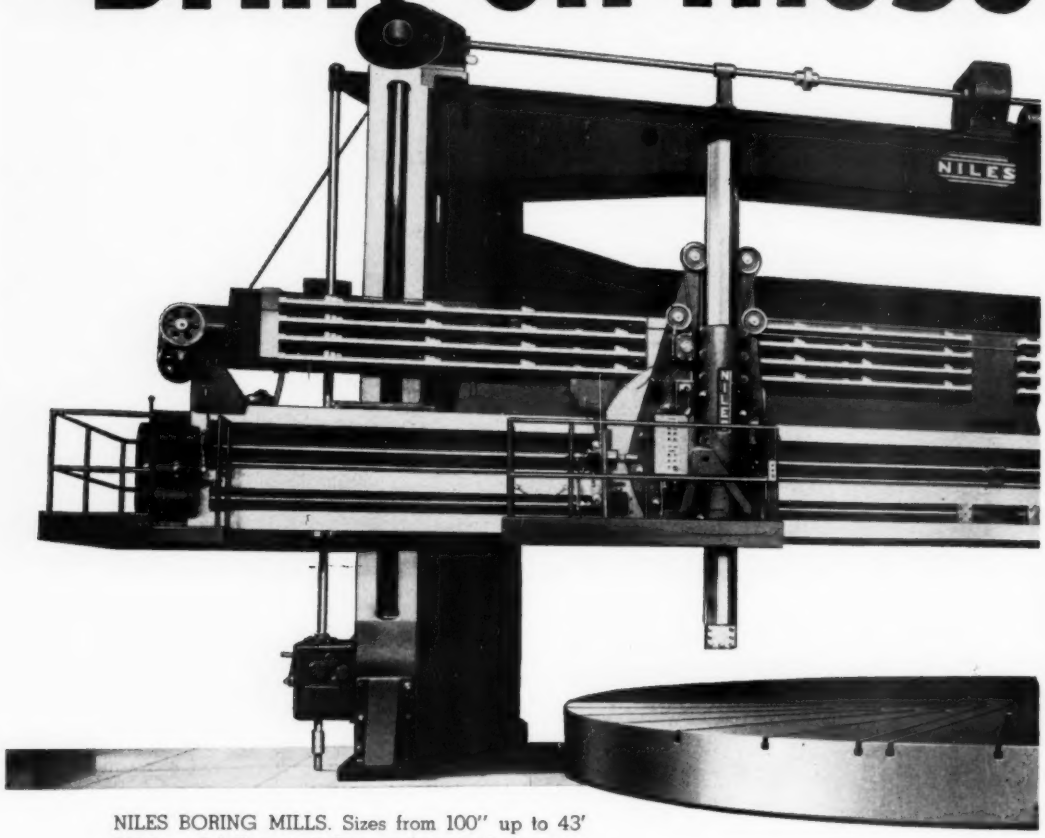
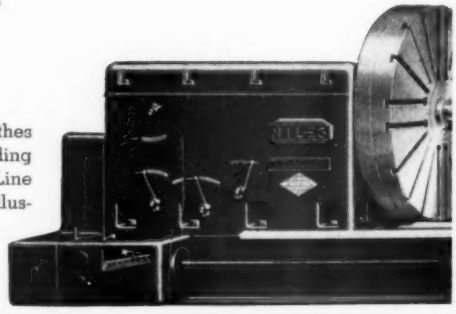
makes ALL Abrasive Products ...to give you the proper ONE

"Carborundum" is a registered trademark which indicates manufacture by The Carborundum Company, Niagara Falls, N.Y.

Bring on those



NILES BORING MILLS. Sizes from 100" up to 43' (43-ft. model illustrated). Designed to take the heaviest strains without distortion—maintain close tolerances under high-production operation.



NILES LATHES. These heavy engine lathes reflect over 100 years' experience in building high-output, high-precision equipment. Line includes 40", 50", 60", 70", 80", 90" (illustrated) and larger sizes.

Write to
LIMA-HAMILTON DIVISION
Hamilton, Ohio

BALDWIN-

General Offices: Philadelphia 42, Pa.

BIG JOBS

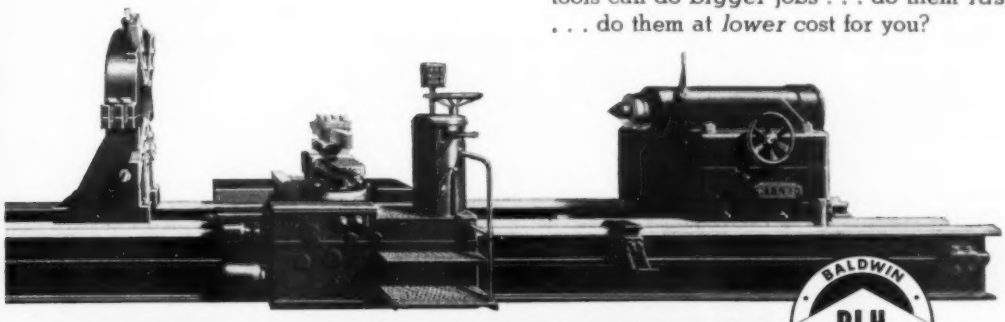
WE CAN HANDLE THEM *RIGHT!*

Got any *tough* assignments for machine tools? That's what this modern Niles equipment is looking for!

Machine tools like this 43-ft. boring mill and 90" lathe can take care of your *customers'* demands for bigger and bigger jobs . . . and *your* demands for faster and better production, that is the only hedge against today's rising costs.

Under the new Baldwin-Lima-Hamilton name, the line retains everything that has made Niles a guarantee of superior performance—plus advantages that come from increased manufacturing facilities, pooled engineering skills, and expanded service.

Why not write, wire or phone and let one of our representatives demonstrate how Niles tools can do *bigger* jobs . . . do them *faster* . . . do them at *lower* cost for you?



LIMA-HAMILTON

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EMULSIFIER STH

A new coolant-lubricant

Now Available for . . . . . CUTTING GRINDING • DRAWING STAMPING

Emulsifier STH is now commercially available for use by the American metal-working industry. A product of ten years of research and field development both in this country and abroad, Emulsifier STH is *based on a new family of chemical compounds* which possesses unusual lubricating properties.

This water-soluble, metal-working lubricant can be *used on all types of machines with sealed recirculating systems.* Emulsifier STH is in use in automatic chucking machines, hand screw machines, turret lathes, cylindrical and surface grinders, mechanical saws, drill presses, milling machines, and broaching machines. *Drawing and stamping are being done successfully* with Emulsifier STH.

Emulsifier STH *can be used with ferrous and non-ferrous metals and alloys.* It is especially effective on very soft and very hard steels and has given satisfactory results where other soluble cutting oil emulsions have failed.

The unique chemical structure of Emulsifier STH gives it extremely good heat stability and insures freedom from rancidity. Among the "plus values" obtainable with Emulsifier STH are its exceptionally good emulsion transparency and its superior rust inhibition.

for *detailed information and the results of field experience, write for descriptive literature.*

INVESTIGATE THESE MONEY-SAVING ADVANTAGES OF EMULSIFIER STH!

- Smaller daily "makeup" additions
- Less frequent reservoir cleanout
- Longer tool life
- High tool speed and increased output
- Better finishes and fewer rejects

write for ***• FREE*** *descriptive bulletin*

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PRODUCT DEVELOPMENT DEPARTMENT
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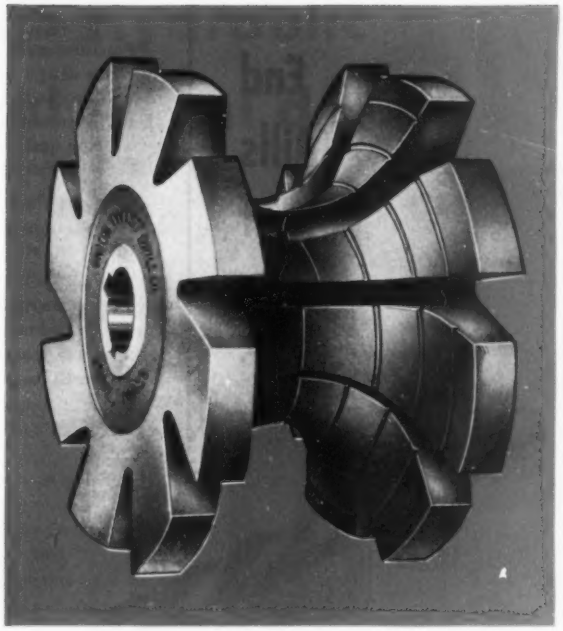
From Research to Reality . . .

You get more duplicate parts... with

UNION

Form Cutters

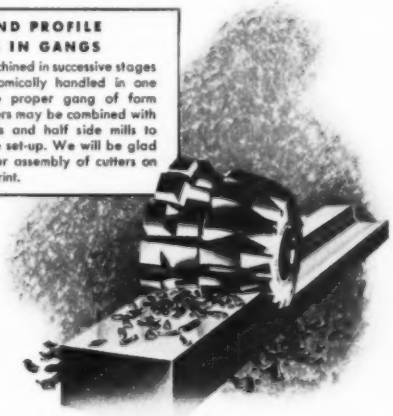


MADE OF HIGH SPEED STEEL, Union form cutters are designed to cut with high accuracy within commercial limits. Where even greater accuracy is required, we are prepared to grind form cutters to much closer limits.

UNION FORM CUTTERS, as the name implies, are made to a certain outline or shape, for the production of parts which shall be duplicates, regardless of the number produced. Since they are ground on the face of the tooth, their form remains unchanged by repeated sharpening — when properly done — so that every piece milled during the life of the cutter will be a duplicate. And since, like all Union tools they are built to give extra-long service life, you'll find that Union form cutters are your surest bets for maximum production of duplicate parts with a single cutter—and for greatly reducing milling expenses in this type of operation.

FORM AND PROFILE CUTTERS IN GANGS

Many pieces now machined in successive stages may be more economically handled in one operation, using the proper gang of form cutters. Or, form cutters may be combined with plain mills, side mills and half side mills to finish the work in one set-up. We will be glad to suggest the proper assembly of cutters on receipt of your blueprint.



no other form cutter will outperform a **UNION**

contact your local distributor

His name is listed in Union's THOMAS' REGISTER insert under "Drills, Twist".

UNION TWIST DRILL COMPANY, ATHOL, MASSACHUSETTS

Milling Cutters · Gear Cutters · Twist Drills · Hobs · Reamers · Carbide Tools

We own and operate S. W. CARD MANUFACTURING CO. Division, Mansfield, Mass. Taps, Dies, Screw Plates . . . BUTTERFIELD DIVISION, Derby Line, Vt., Taps, Dies, Screw Plates, Reamers . . . BUTTERFIELD DIVISION, Rock Island, Que., Milling Cutters, Twist Drills, Hobs, Reamers, Taps, Dies, Screw Plates.

End Mills that Save Down-Time

Precision-made end mills that meet the highest standards of cutter design have advantages especially important in fulfilling today's high production requirements. They cut faster, more freely, and with less power. Their greater wearing qualities enable them to turn out more work between sharpenings — reduce machine down-time.

Brown & Sharpe End Mills are made under exacting quality control, from start to finish. In both steel formula and heat treatment, they are closely held to rigid specifications. Careful machining maintains consistent adherence to design standards.

To assure maximum productivity from your milling machines, specify end mills and other cutters from the complete Brown & Sharpe line. Write for Catalog.
Brown & Sharpe Mfg. Co., Providence 1, R. I., U.S.A.

Extra-long, fast spiral

Long, two-flute, fast spiral

Fast spiral, double end

Ball end, two-flute, fast spiral

WE URGE BUYING THROUGH THE DISTRIBUTOR

Brown & Sharpe B·S

Versatile BLISS Hydraulic allows unusual metal design

A new 600-ton Bliss double-action hydraulic press enables Carrier Corporation to produce the smooth-looking, but hard-to-make contours for its extensive line of air conditioners.

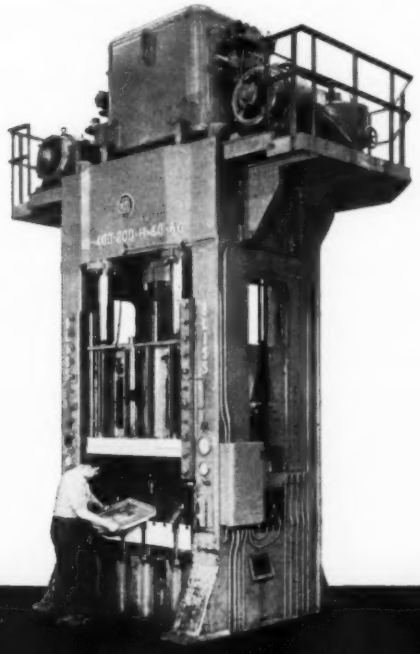
"By varying ram, blankholder, and cushion pressures and the draw cycle, we have been able to complete difficult drawing operations with sharp corners and small radii at the bottom. The press' flexibility also enabled us to use, more successfully than ever before, steel sheets which remained in stock for a long period, some showing evidence of open grain structure. Actually the press has exceeded our expectations," reports George R. Auld, Carrier's Vice President of Manufacturing.

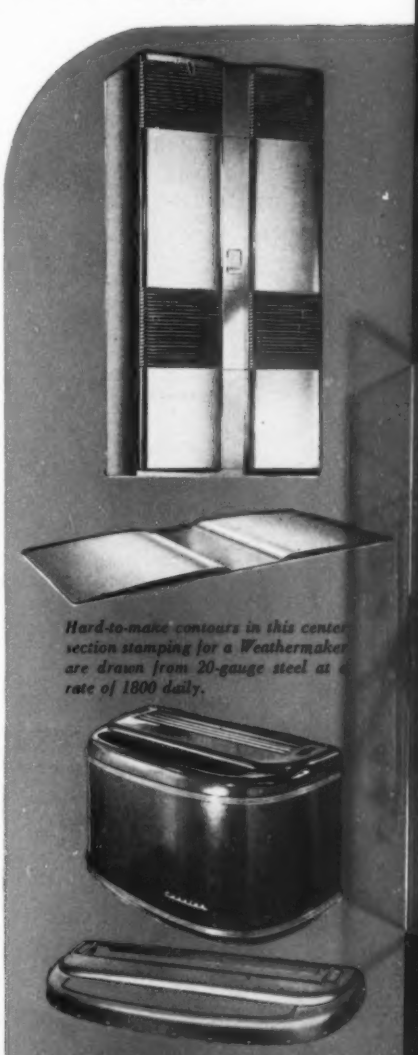
The press has been operated continuously on a 24-hour basis at maximum speed—*without missing a stroke.* No adjustment or maintenance attention was necessary. "At no time has the press ever been down due to its own inability to operate," says Mr. Auld.

This is another "live" example of what Bliss engineers mean when they promise "the right press for a given job." It's your guarantee of equipment precisely suited to your requirements, whether it's a single press—mechanical or hydraulic—or a complete stamping plant.

E. W. BLISS COMPANY, CANTON, OHIO

Mechanical and Hydraulic Presses, Rolling Mills, Container Machinery

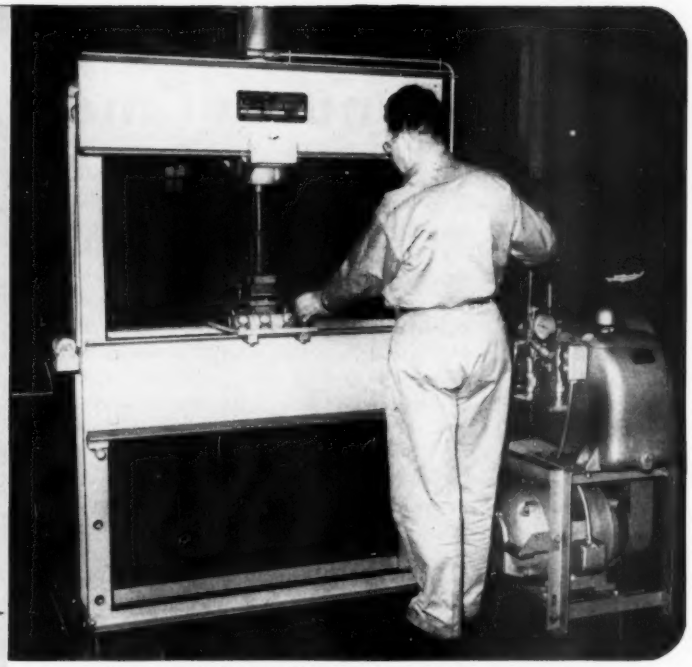




Hard-to-make contours in this center section stamping for a Weathermaker are drawn from 20-gauge steel at a rate of 1800 daily.

Top panel for window model Room Air Conditioner has intricate contours, sharp corners and bottom radii. Produced at rate of 1,200 per eight-hour shift from .018-gauge steel.

From a single press for a given job . . . to a complete press room . . . It's Bliss



Above is a standard Rodgers 60 ton Shop Press with a Rodgers Power Pump. Other models have capacities of 80, 100, 150, 200, 300 and 400 tons.

HERE'S Rodgers Hydraulic POWER ...to do 101 jobs faster, better, easier

You'll find a Rodgers Shop Press is the finest all-around time-and-labor-saving equipment you can have in your plant . . . for a multitude of pressing, forming, bending, straightening jobs . . . for die tryout . . . and even short production runs.

Their many exclusive features make Rodgers Shop Presses unusually versatile in performance . . . and there are several standard models and capacities to suit most every shop or plant requirement.

Other Rodgers Hydraulic Equipment is available too, for *your* special jobs.

SEND FOR CATALOGS

Complete details of Rodgers Equipment are covered in available catalogs. Write for them.

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Rodgers Hydraulic, Inc.

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You'll Want this New Folder About Better

GET your free copy of this useful new 6-page folder, now! It brings to you a picture-trip through the modern, daylight G.S. plant. Fifteen attractive halftone illustrations presenting a few of the many *different types* of G.S. Fractional Horsepower Gearing appear across the 3-page inside spread. Then, on the back page, you'll discover two useful standard charts. If the economical, mass production of better Small Gearing, from 12 to 96 D.P. is an important consideration in your business, then *by all means* send for this free folder now. Learn all about G.S. facilities, developed to their present high degree of perfection through more than 30 years of specializing in making Fractional Horsepower Gearing *exclusively!*

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GEAR SPECIALTIES, INC.
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Gentlemen: Please send me at once, a free copy of your new 6-page folder about G.S. Fractional Horsepower Gearing.

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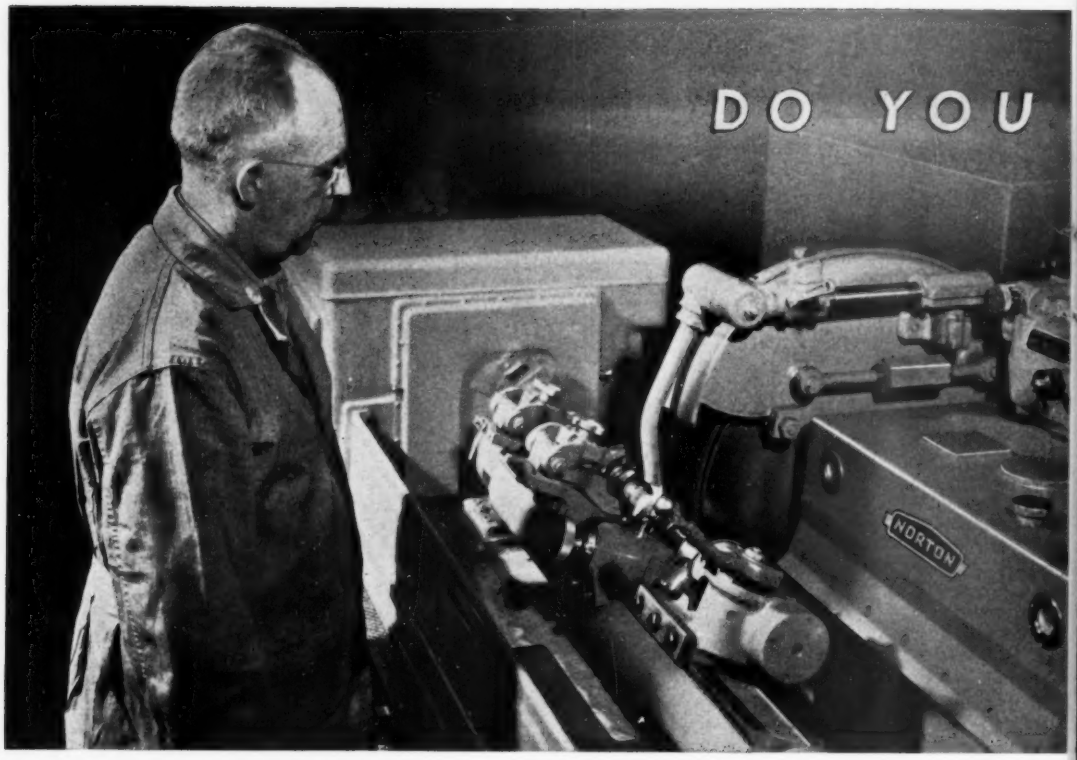
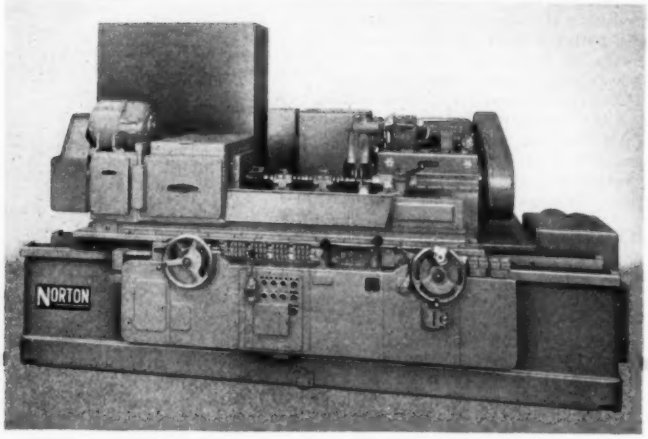
WORLD'S LARGEST EXCLUSIVE MANUFACTURERS OF FRACTIONAL HORSEPOWER GEARS





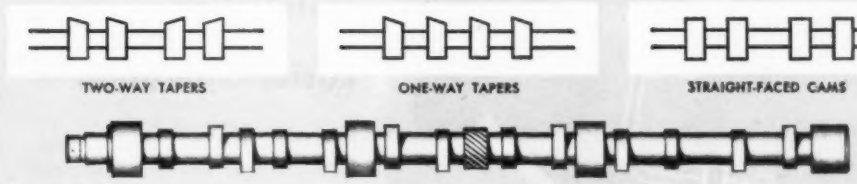
NORTON NO. 2
CAM-O-MATIC
AUTOMATIC
Cam Grinder

Making better products to make other products better

WANT TAPERS ON YOUR CAMS?

with the new *swiveling wheel slide feature of the NORTON No. 2 CAM-O-MATIC Machine you can speedily produce two-way tapers — one-way tapers — or straight-faced cams**

***PATENTED BY NORTON**



Are your camshafts designed with tapered cams, or is this requirement anticipated in the future?

If so, the new Norton patented feature which makes it possible to grind two-way or one-way tapers — or to grind straight-faced cams at any time by means of a simple adjustment, greatly increases the capacity of the No. 2 CAM-O-MATIC Machine to fully meet your present or future requirements.

Investigate the possibilities of this new feature. It puts extreme versatility constantly at your command.

NORTON
GRINDERS and LAPPERS

NORTON COMPANY, WORCESTER 6, MASS.

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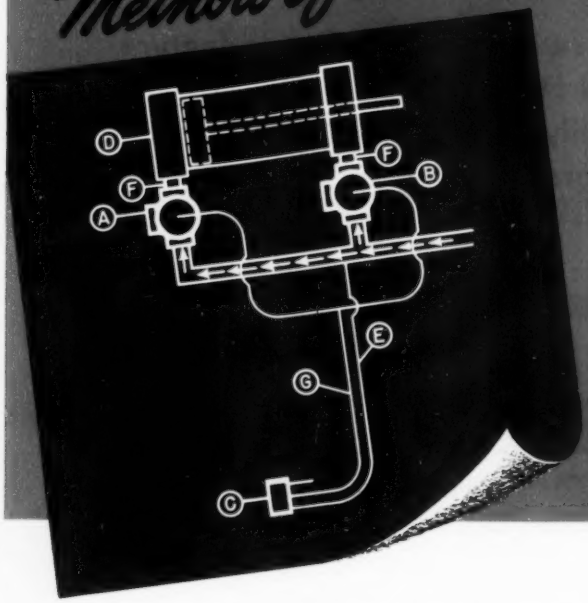
How to Boost Production with new Method of Mounting Ross Valves



★ **Faster Machine Speeds**

★ **Less Air Consumption**

★ **Economical Installation**

★ **Easier Operation**

Close-coupling of valve to cylinder! That's the story behind the remarkable success of the *new Ross In-Line Master Valve.*

Users claim several important advantages. By placing the master valves (A & B) at the cylinder (D), air supply and exhaust are speeded up appreciably. This in turn permits faster movement of the cylinder piston and materially increases production.

At the same time, the close coupling means that two lengths of large diameter piping between valve and cylinder—pipes continually filled and exhausted with non-productive air—are replaced by two short connecting pipes (F). The resultant saving in air with every movement of the piston considerably reduces operating costs.

Operation is by a small, conveniently located 3-way pilot valve (C). It is supplied through tubing (E) and connected to the master valves by tubing (G). It may be mechanically, manually or electrically controlled. Hand or foot operation is greatly facilitated by the use of the smaller, more easily actuated pilot model.

The complete story of possible advantages in *your* production will be gladly furnished without obligation. Ask for Bulletin No. 302.

Ask Ross for Any Air Control Information

Ross makes valves only — hundreds of types and sizes. Take advantage of the experience gained in over a quarter century of concentration on control and application of air power!

ROSS OPERATING VALVE COMPANY

ROSS Air Control VALVES

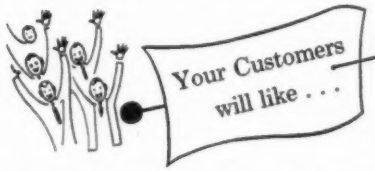
120 E. GOLDEN GATE AVE., DETROIT 3, MICHIGAN

Which Design

answers your most important problems about micronic filtration?

WHICH
is the only micronic filter that works by a positive mechanical principle?

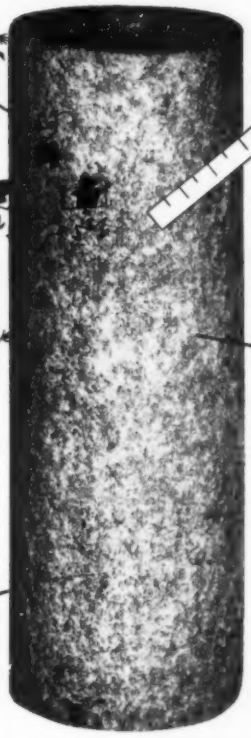
Cuno MICRO-KLEAN cartridge consists of tiny fibres distributed under scientific control and resinous impregnated and polymerized to prevent softening, swelling, hardening, shrinking, rupture or channelling. Solids are simply entrapped in the interstices—no other means is utilized. Densities: 10, 25, 50 microns. Wide range of fluids, flow rates and capacities (from a few to more than 800 gpm). Single or multiple cartridge units.



Longer life—Exclusive "graded density in depth" permits smaller particles to penetrate to varying depths—doubles dirt-holding capacity.

Low pressure drop

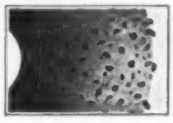
Changing cartridge is quick—and clean.



No Fluid Is Better Than Its Filtration

WHICH FILTER
needs the least amount of room?

Cuno MICRO-KLEAN cartridge is utterly simple. It's all filter, no structural components. This means less space needed—and makes *full-flow filtration* practical for either external or built-in applications.



WHICH FILTER
is guaranteed for specific performance?

Felting of fibres is accurately controlled for various densities . . . so that a Cuno MICRO-KLEAN of a given density will positively remove 100% of all solids for which it is rated, plus a large percentage down to 1 micron.

CUNO

Complete Line

Fluid Conditioning

Removes More Sizes of Solids from More Types of Fluids

MICRONIC Micro-Klean • DISC-TYPE Auto-Klean
WIRE-WOUND Flo-Klean

Mail this Coupon . . . for FREE Catalogs

Make Sure to Investigate MICRO-KLEAN ***First***

- ☐ Lubricating Oil
- ☐ Hydraulic Oil
- ☐ Water and Water Solutions
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- ☐ Fuel Oil
- ☐ Acids

CUNO ENGINEERING CORPORATION
2414 South Vine St., Meriden, Conn.
Please send information on Cuno MICRO-KLEAN for services checked.

Name.....Title.....
Company.....
Address.....
City.....State.....

PLEASE ATTACH COUPON TO YOUR BUSINESS LETTERHEAD

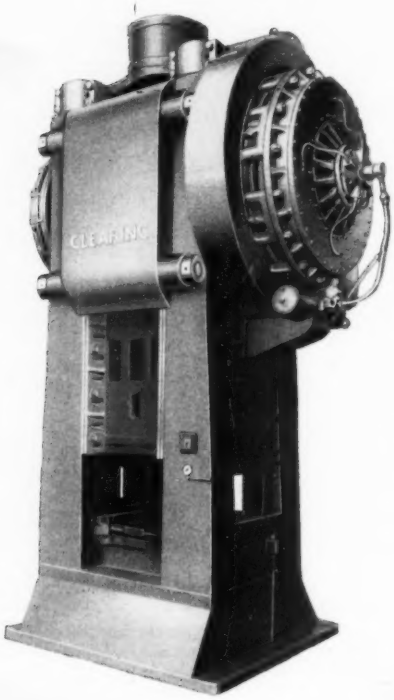
Announcing

the NEW improved

FORGING PRESSES

SERIES EF

by CLEARING...



Faster production in forging or cold coining operations, using less skilled labor yet holding ever closer tolerances in output—that's what manufacturers for defense or civilian needs are demanding today. Clearing meets those demands —all of them—with its new Series EF presses, which incorporate many improvements over previous Clearing forging presses.

Short-travel disc clutch and brake act faster to speed operation. Offset eccentric allows continuous guiding of extra long slide to assure maximum precision. Coordinated knockouts minimize contact time to keep dies cooler, longer lasting.

We can't tell the whole story here, but we'll gladly supply details at your request.

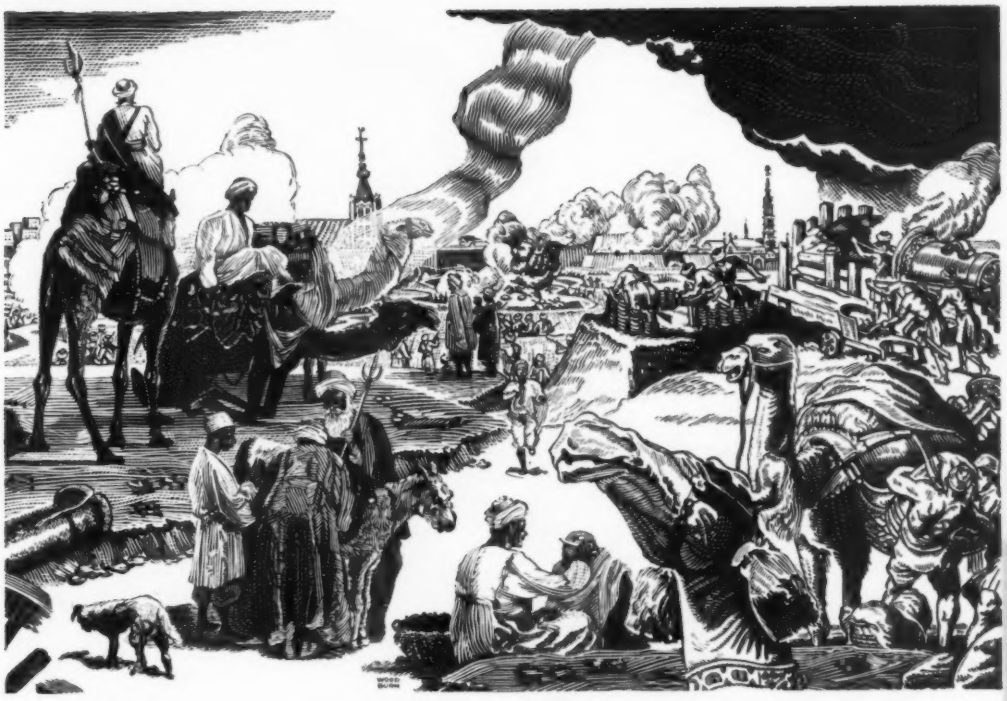
CLEARING MACHINE CORPORATION

6499 WEST 65th STREET • CHICAGO 38, ILLINOIS

CLEARING PRESSES

THE WAY TO EFFICIENT MASS PRODUCTION

CMC CLEARING



Steel saved civilization at Vienna

MODERN history begins with the record of conflict between Christians and Moslems--six centuries of wars that opened with the Crusades and saw the Turks capture Constantinople in 1453.

More than 100,000 Turkish janizaries and cavalry besieged Vienna in 1683. For two months, to quote the diary of an eye witness, "The enemy continued playing their cannon and granadoes. But the city walls were strong, Christian cannon were bigger and more numerous and ammunition more plentiful." Finally came a day when the officer's journal reported, "The enemy did not play their cannon so fast. It was confirmed that they had no great provision of bullets, inasmuch as they shot back not only our bullets, but also pummels of swords and all sorts of iron and stones."

At last a great Christian relief army was assembled. "They made an attack in the best order that ever army did. The enemy, forced always to give back, were put all into confusion. They betook themselves to flight, leaving all their provisions, ammunition, cannons and tents --the greatest part rendered unfit for farther use by our great guns."

Never again did the Turks seriously menace Christendom. Western civilization had been saved once more by its supremacy in the use of iron and steel. To aid our survival America's free private industry is producing steel at the highest rate ever known--and still expanding. The question remains--Will America use enough of this tremendous steel production to guarantee the continued supremacy of Western, Christian civilization?---We believe the answer is yes!

YOUR SCRAP IS NEEDED — YOUNGSTOWN

The Youngstown Sheet and Tube Company

General Offices--Youngstown 1, Ohio
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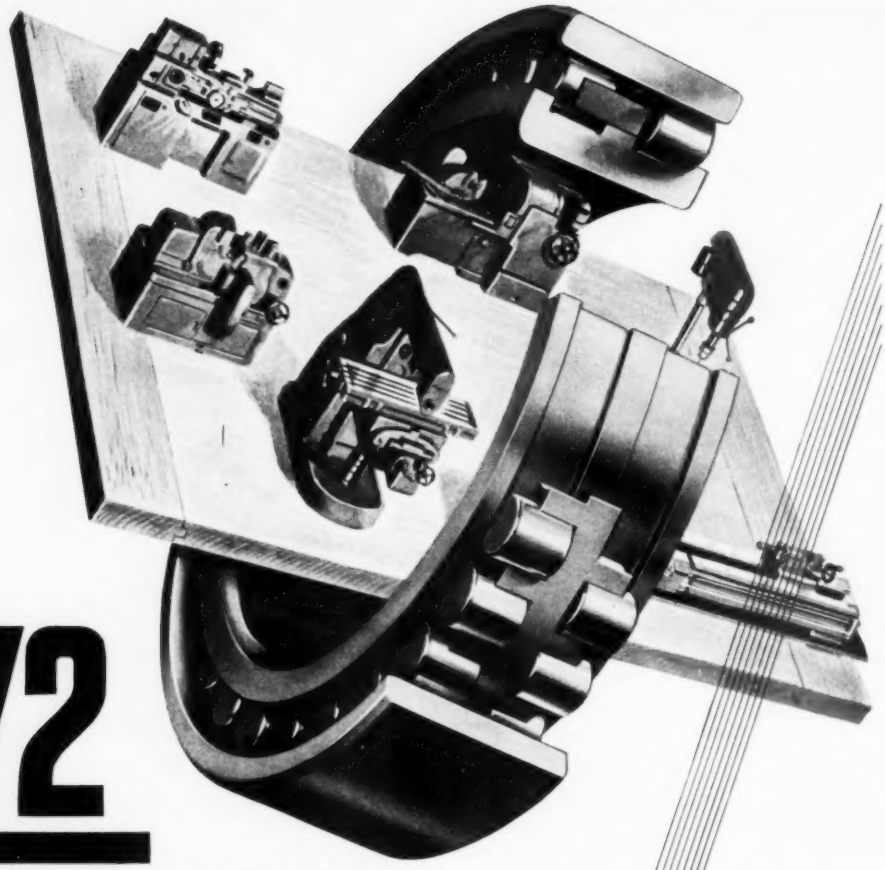
MANUFACTURERS OF CARBON ALLOY AND YOLOY STEELS

The steel industry is using all its resources to produce more steel, but it needs your help and needs it now. Turn in your scrap, through your regular sources, at the earliest possible moment.



72/101

Yes, 72 out of 101 Machine Tool Builders* use SKF BEARINGS.

This acceptance of SKF Bearings to help provide the highest accuracy under severe conditions is typical of SKF's acceptance by *all* industry.

7167

8 REASONS WHY SKF IS PREFERRED BY ALL INDUSTRY

- integrity
- craftsmanship
- metallurgy
- tolerance control
- surface finish
- product uniformity
- engineering service
- field service

SKF
BALL AND ROLLER BEARINGS

SKF INDUSTRIES, INC., PHILADELPHIA 32, PENNA.
-manufacturers of SKF *and* HESS-BRIGHT *Bearings.*

*Major manufacturers of metal turning and metal removing equipment.

IF YOU WANT THE ANSWER... TO ALUMINUM EXTRUSIONS!

You'll find it in this *NEW* W-S Bulletin 340-A, just coming off press. Write for your copy . . . Today!

This booklet not only illustrates the complete-line of W-S Extrusion Presses, including capacities, but, it also shows how production can be improved . . . increased. You can produce the extrusions you want —when you want them, at greatly reduced cost, and in these days of material shortages you won't have to carry expensive slow moving inventory.

Read about the *fast die-change* which permits one-man set-up and die-change. Read about the—Remote —push button automatic cycle controls featuring faster cycles of production—it gives you continuous operation without costly cycle delays.

This booklet shows you how others are extruding light metals and non-ferrous shapes—fast—profitably. It tells you why each and every individual W-S Machine is a complete "packaged" extrusion plant. Write for your copy . . . today, to Watson-Stillman, the "Headquarters" for Extrusion Presses.

HYDRAULIC MACHINERY DIVISION **WATSON-STILLMAN** ESTABLISHED 1848

Factory and Main Office: 163 Aldene Rd., Roselle, New Jersey

Branch Office: 230 N. LaSalle, Chicago, Ill. • Manufactured in Canada by—Canadian-Vickers, Ltd., Montreal

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Pittsburgh 19, Pa. ..... Stanley Berg & Co.
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San Francisco 7, Cal. ..... Schellenbach Mach. Tool Co.
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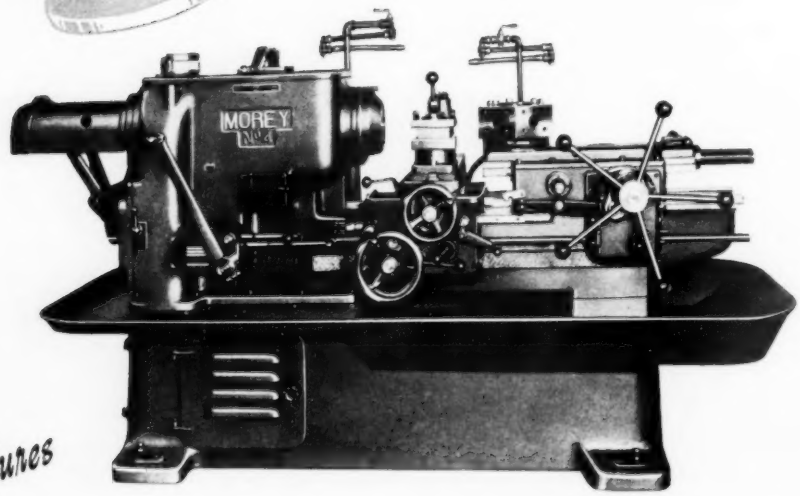
W-S "COMPLETELINE" HYDRAULICS . . . THE SHORTEST DISTANCE FROM PRODUCTION TO PROFITS

MOREY

TURRET LATHES

No. 2 Plain Type

Nos. 3, 4 and 5 Universal Type



Features

Infinite variable vibrationless spindle speeds.

Remote speed selection control for speed and ease of operation.

The newly designed MOREY TURRET LATHES take advantage of tungsten carbide tools and incorporate all technical improvements in metals, electronics and hydraulics . . . our design is not hampered by tradition.

Size	Bar Capacity	Swing	Motor
No. 2 Plain	1" x 6"	14"	3 HP
No. 3 Universal	1 1/2" x 10"	16 1/2"	5 HP
No. 4 Universal	2" x 12"	19 1/2"	7 1/2 HP
No. 5 Universal	2 1/2" x 14"	21 1/4"	15 HP

FOR BAR and CHUCKING WORK

OBTAIN MAXIMUM PRODUCTION WITH MINIMUM EFFORT FROM MOREY TURRET LATHES . . . **INVESTIGATE!**

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Speed reduction problem?

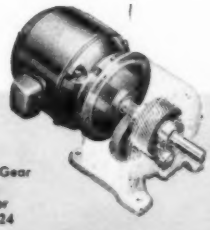
Is it Ratio? Space? Shock? Overload?

No *one* speed reducer solves *every* reduction problem. That's Why LINK-BELT Builds All THREE.

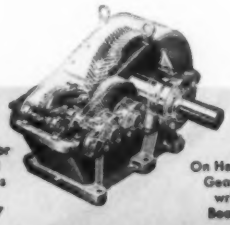
FOR the *right* speed reducer engineered to match your exact conditions, your best bet is Link-Belt. Link-Belt builds all three — Gearmotors, Herringbones, Worms. When a Link-Belt power transmission engineer analyzes your problem, he isn't tempted to fit his recommendations to a limited line.

You can also be sure that the Link-Belt unit recommended is engineered and built for tough operating conditions. And efficiency in power transmission is matched by flexibility in application!

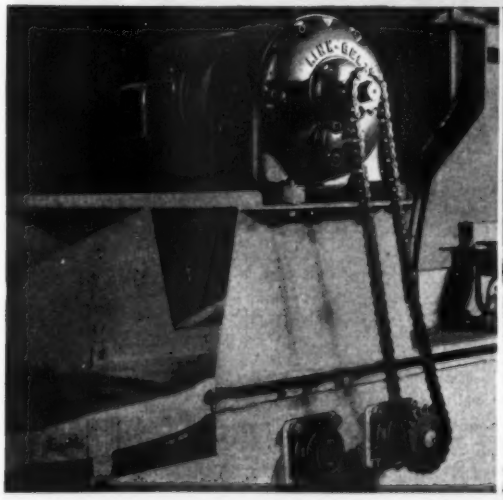
On Worm Gear Drives write for Book 2324



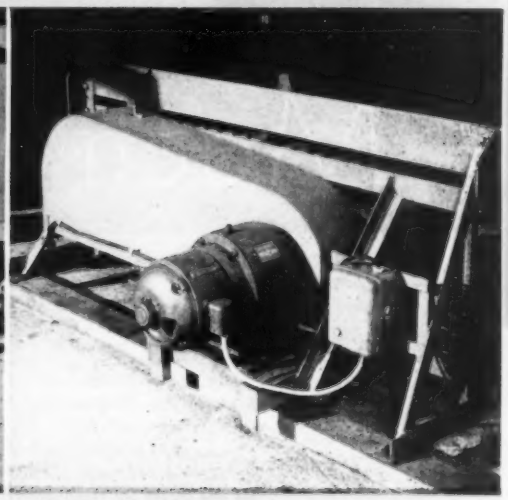
On Gearmotor and Helical Gear Drives write for Book 2247



On Herringbone Gear Drives write for Book 2419



Link-Belt 1 hp Gearmotor, conveniently mounted, operates a revolving plate disc used in manufacturing tin cans. Note also Link-Belt Roller Chain and Roller Bearing Flanged Block.



Conveyor section of a railroad tie doweling machine driven by a compact Link-Belt 2 hp Gearmotor through an enclosed Link-Belt Precision Steel Roller Chain Drive.

LINK-BELT

ENCLOSED GEAR DRIVES

12,510-A

LINK-BELT COMPANY: Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8, Springs (South Africa). Offices, Factory Branch Stores and Distributors in Principal Cities.

of gears is a matter of fitting competent men and efficient machines to the job. One machine may be used to make a variety of gears. But the quality of some types it produces might suffer . . . or the cost might be higher.

• Here at BRAD FOOTE . . . in our own plant . . . we have an assortment of gear-making machines each of which is used to make gears within certain specifications. This enables us to turn out a volume of gears while positively controlling quality and price. Our highly skilled workers subscribe to and uphold the BRAD FOOTE creed—*"No one shares our responsibility."*

• So when you specify BRAD FOOTE gears—for use in your shop or on the equipment you sell to others—you can be sure of satisfactory performance.

BRAD FOOTE GEAR WORKS, Inc.

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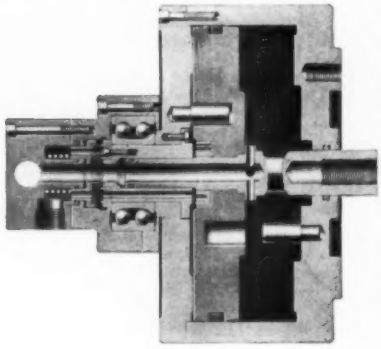
The *New* CUSHMAN Iron body Air Cylinders

SIMPLE, RUGGED, PRECISION-BUILT UNITS
YOU CAN INSTALL ON YOUR PRODUCTION LINE AND *FORGET*



These new iron body air cylinders follow the well-proved design of our very successful high speed aluminum body cylinders. They are suitable for operating either Cushman Air Chucks or those of other makes. Note these important features:—

Cylinder Body is one piece casting, light in weight, yet ample in section. Bore is precision lapped and piston fitted with special "O" ring seal. In addition, operation is protected by a graphitar disc air seal (patent applied for) that is pressure balanced under load. You will have no trouble with air pressure leakage under heaviest recommended production loads.

Large air ports speed operation. Static balancing after assembly eliminates vibration. Installation, controls and operations are very simple.

Write for bulletin No. PO-8. And please anticipate your needs, since deliveries are tightly scheduled.

THE CUSHMAN CHUCK COMPANY, HARTFORD 2, CONNECTICUT

CUSHMAN CHUCKS

A World Standard for Precision

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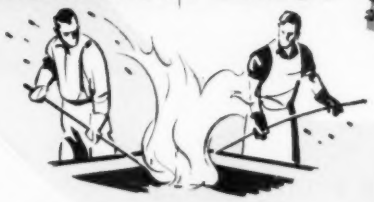
FREE!

SEND FOR THIS VALUABLE HANDBOOK

"HEAT TREATING ALUMINUM ALLOY"



One in a Series of Aluminum Design and Fabricating Books

All you need to know about heat treating aluminum alloys

Until recently, little information has been available on heat treating the aluminum alloys. There has been a great need for this information, since aluminum has become one of America's foremost metals.

Now, in this 144-page illustrated booklet, the Reynolds Metals Company has brought together all the latest information on the subject in a form readily usable by both the non-technical man and the highly trained technician.

The book was prepared with the assistance and collaboration of some of the country's leading metallurgists and organizations. Contains photomicrographs showing how the crystal structure should look for various treatments and alloys.

The book is divided into four parts for ready understanding and use. Section One breaks down the subject into easily understandable concepts which the non-technical reader can follow and obtain a basic understanding of the metallurgy and heat treatment of the aluminum alloys.

Section Two presents in brief tabular form the recommended heat-treating cycles for the various specific aluminum alloys.

Section Three is for the metallurgist. There he will find a more technical discussion of the various thermal treatments as well as information on possible difficulties and their cure.

Section Four contains detailed tables of mechanical properties for wrought and cast (sand, permanent-mold and die) alloys.

Application of the methods described in this book can improve the quality of your product and mean more profit through less rejects.

And if you have a *special problem* on any phase of production with aluminum, take advantage of the trained staff of Reynolds Aluminum specialists waiting to help you. Let them show you how to overcome difficulties and set up for fast, economical processing. For prompt service, call the Reynolds office or your distributor listed under "Aluminum" in your classified telephone directory.

SEND FOR THIS VALUABLE HANDBOOK TODAY!

Get your free copy of "Heat Treating Aluminum Alloys" and a complete index of Reynolds technical literature. Please request on business letterhead (otherwise price is $1.00) Write today to Reynolds Metals Company, 2523 South Third Street, Louisville 1, Kentucky.

REYNOLDS METALS

REYNOLDS ALUMINUM

MODERN DESIGN HAS ALUMINUM IN MIND

Announcing the new SIP jig boring and *milling* machine

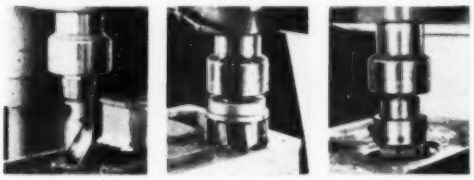
Hydroptic-6

with viewing screens

for table and spindle head settings

OUTSTANDING ADVANTAGES:

1. **Exceptionally rapid co-ordinate settings** on the magnified image of the built-in standard scales.
2. **Powerful spindle head** incorporating a self-contained drive and a spindle mounted at the nose in double taper roller bearings.
3. **Large free distances** between uprights and between table top and spindle end.



SPECIFICATION

Working range	40 in. × 28 in.
Table working surface	43 1/4 in. × 33 in.
Maximum distance from table top to spindle end	35 1/2 in.
Free space between uprights	43 1/4 in.
Hydraulic feeds	from 12 in. to 100 in./min.
Spindle internal taper	Morse No. 4
18 speeds	from 40 to 2000 r.p.m.
Spindle quill travel	10 in.
Boring capacity	12 in.
Graduation of standard scales built into the work-table and the spindle head saddle	0.1 in.
Size of viewing screens	9 5/16 in. × 2 7/16 in.
Reading on external auxiliary scales	0.1 in.
Reading on screen micrometer drums	dial 0.001 in.; vernier 0.0001 in.

Guaranteed setting accuracy: .00015in.

AMERICAN SIP CORPORATION

HIGH PRECISION MACHINE TOOLS AND MEASURING EQUIPMENT

100 East 42nd Street NEW YORK 17, N. Y.

CrysCoat

is in Good Company!

*Prepares Metal Surfaces for Painting

*Patented Material and Process

FASCO Industries, Inc., (formerly F. A. Smith Manufacturing Co., Inc.,) design and engineer quality products for maximum operating efficiency, economy of installation and upkeep, and consumer eye-appeal. Illustrated above is the FASCO No. 55 "Lo Level" Floor Circulator. FASCO'S precision-built products are CrysCoated before painting to assure long finish life and to protect surfaces against the ravages of rust.

The Oakite *CrysCoat* Process may be just what you're looking for. With minimum equipment . . . in minimum time . . . at minimum cost you can (1) clean metal surfaces and condition them for painting; (2) improve the adhesion of paint to metal; (3) prevent corrosion before metal is painted; (4) localize corrosion under paint if finish is broken.

The Oakite *CrysCoat* Process Offers These Extras:

1. **Eliminates operations . . . uses less equipment**
2. **Cuts operating time**
3. **Uses less chemicals for cleaning and conditioning**
4. **Reduces heating costs**
5. **Saves cost of expensive acid-proof tanks and equipment**
6. **Saves cost of frequent descaling and desludging**
7. **Drag-out costs are less because of low original cost of solution**
8. **Saves paint**
9. **Cuts cost of rejects caused by rusting before painting**

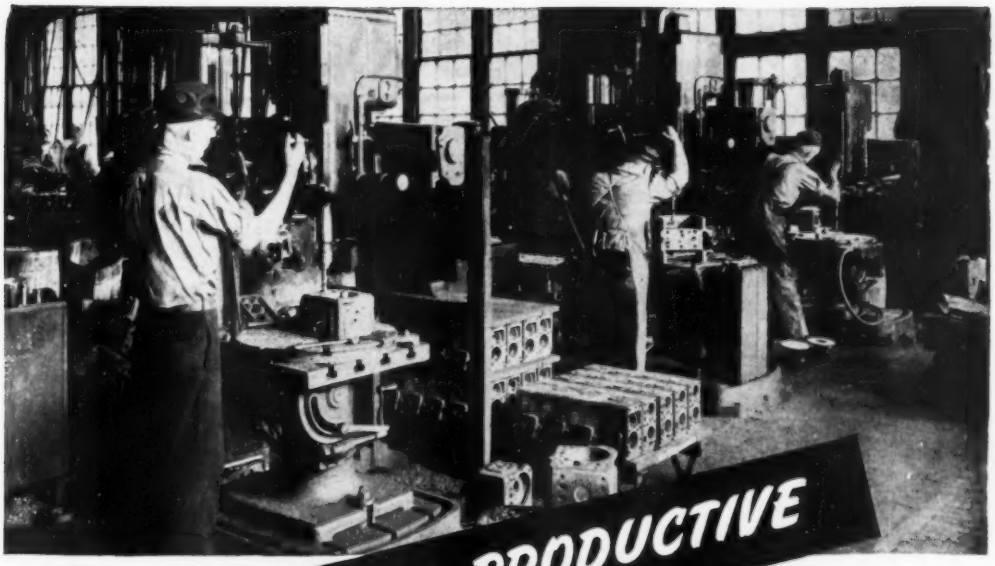
FREE . . . illustrated folder describes the Oakite *CrysCoat* Process for use in before-paint-treatment of steel, aluminum sheet and castings, zinc die castings and galvanized surfaces. If you are engaged in the fabrication of civilian goods or the speedy production of defense orders—send for Folder F7642.

OAKITE PRODUCTS, INC., 24 Thames St., NEW YORK 6, N. Y.
Technical Service Representatives in Principal Cities of U. S. & Canada

SPECIALIZED INDUSTRIAL CLEANING

OAKITE

MATERIALS • METHODS • SERVICE

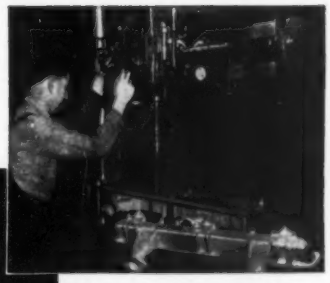


HIGHLY PRODUCTIVE

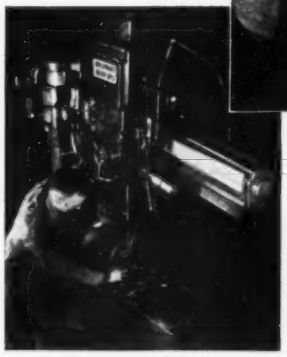
High speed brought profit on these jobs. These quiet, smooth, Cincinnati Bickford High-Speed Super Service Drills are equipped with modern, easy controls—all centralized on the head, at the operator's hand. They give long, trouble-free performance.

Every operation conveniently controlled—nine spindle speeds controlled by one lever—dials large and easily read—arm swings with a finger-tip ease—automatic lubrication, and many other features to give the greatest ease of performance.

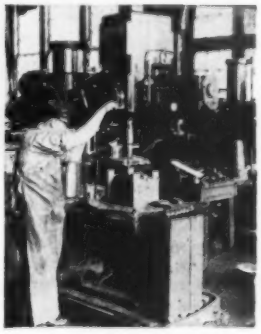
Write for Bulletins R-26A and R-21B.



Due to the construction of this machine, long drills are used with accuracy.



This Super Service Radial reduced the time on this job from thirteen minutes to five minutes.



On this job a universal table increases speed of production.

RADIAL AND UPRIGHT SUPER SERVICE DRILLING MACHINES

Equal Efficiency of Every Unit Makes the Balanced Machine

THE CINCINNATI BICKFORD TOOL CO. Cincinnati 9, Ohio U.S.A.

TRY THIS *cost-cutting team* **for CARBIDE GRINDING**

Wickman Steel-Bonded Diamond Wheels practically indestructible with extra long life. Diamond particles stay in place until completely worn. Finish tools better for longer tool life.

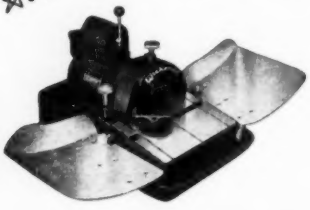
Wickman Resinoid-Bonded Diamond Wheels for faster and freer carbide cutting and less frequent wheel dressing.

Wickman Chip-Breaker Diamond Wheels steel-bonded for much longer life than other chip-breaker diamond wheels. Reduce wheel and tool costs materially and speed grinding 3-4 times.

Complete facts in free 52-page catalog.

Grinding with Diamond or Abrasive Wheels is

☆FAST! ☆ECONOMICAL!



on the Wickman GF-2-A

With 1 HP reversible motor and impeller-type 12 gph coolant pump, this heavy bench grinder delivers fast, economical grinding with both silicon carbide abrasive wheels and Wickman steel-bonded diamond wheels. Wheel guards and splash protectors, three position table for wheel wear adjustment, plus a protractor slot for angular grinding, make this the ideal grinder for all off-hand grinding around the shop.

Delivery From Stock. Send for bulletin.

THE **Wickman** MANUFACTURING CO.
15533 Woodrow Wilson Ave.
DETROIT 3, MICHIGAN

Backlash

EXTRACTS FROM CURRENT LETTERS TO THE EDITORS

Burring vs DeBurring

Why not "deburring" (*AM*, June 23, p2)? When you do roughening you put on roughness; when you do smoothing you put on smoothness; so when you would do burring (as you suggested you preferred) you would put on burrs. I vote for deburring.

William W. Farley, 3rd
Cedar Rapids, Iowa

"Deburring" is certainly less likely to be confused, so we yield to the gentleman from Iowa—ED.

Tea for Two — in Britain

This subject of "teatime" (*AM*, April 2, p118) is one to which we have given a great deal of thought, and we certainly would be very pleased to consider the opinions of other companies on this matter.

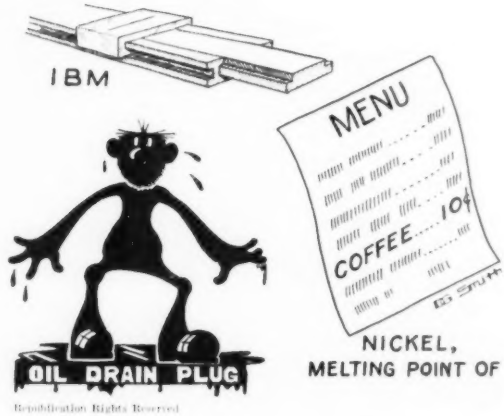
At the moment, we have no official tea break as such, although we do permit our employees, if they so desire, to bring with them a thermos flask of tea of which they can partake any time between 9:30 and 10 AM, at their place of work. If we were convinced that an official break for tea, either in the morning or afternoon or both, would result in increased production, we would certainly introduce these measures immediately.

When one considers the time normally lost in a factory at starting and stopping, I think it is reasonable to assume that unless there was considerable improvement at these times, it would be unwise to retard production still further by stopping the works for the purpose of tea drinking. We would be pleased to know if, in the factories where there are official breaks for tea, the employees adhere religiously to the official starting and stopping times. We consider our employees are not bad timekeepers, but as in many other factories, there are one or two who are slow to start work, and normally these are individuals who are first to stop work.

There is, of course, the other point of view to be put forward, that is that in spite of what Management may say regarding tea drinking, operators somehow or other still manage to make tea. In order to meet this point of view, we do permit the operators to bring with them, as previously stated, a flask

GRINETICS

BY D. G. SMITH



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TWENTY-TWO YEARS EXPERIENCE IN MANUFACTURING PRECISION HONING EQUIPMENT

MICROHONING MACHINES

MICROHONING FIXTURES

MICROHONING TOOLS

MICROHONING ABRASIVES

DEVELOPMENT-ENGINEERING

TECHNICAL SERVICE

The MICROMATIC HONE CORPORATION has been the principal manufacturer of honing equipment for the past twenty-two years. In that time we have designed and put into production thousands of honing installations. An active research and development program has always been maintained. This has resulted in the development of a new, more precise, production process—MICROHONING.

We have the most complete line of Microhoning machines, fixtures, tools (all designed and manufactured in our own plant) available anywhere. We stock and process honing stones manufactured by the three largest abrasive manufacturers in the country. This, plus a staff of Engineers and Service Technicians that have the greatest honing know-how of any organization in the world, warrants us asking that you LET US ASSUME FULL, UNDIVIDED RESPONSIBILITY FOR THE RESULTS OBTAINED WITH YOUR MICROHONING EQUIPMENT.

MICROMATIC HONE CORPORATION

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District Field Offices: 1323 S. Santa Fe Avenue, Los Angeles 21, California • 206 S. Main Street, Rockford, Illinois • 231 S. Pendleton Avenue, Pendleton, Indiana • MICRO-MOLD Manufacturing Division, Boston Post Road, Guilford, Connecticut • 55 George Street, Brantford, Ontario, Canada

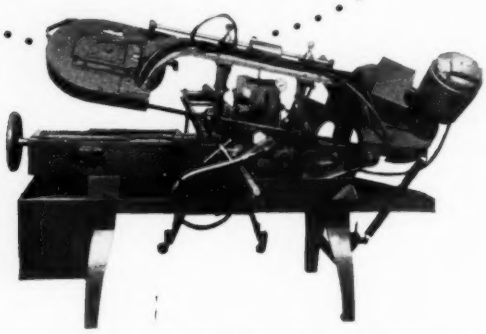
Micromatic

MICROHONING

Write today for CROSS-HATCH describing the MICROHONING *process*

*Reg. U. S. Patent Office

Get the advantages of AUTOMATIC BAR STOCK CUT-OFF at a fraction of the cost you might expect



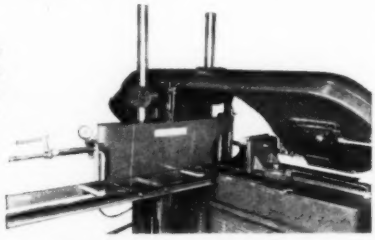
. . . . . with a WELLS SAW and WELLS-O-BAR Feed Master

A set-up for automatic repetitive cutting need not be prohibitively expensive. By combining a Wells Metal Cutting Band Saw and a Wells-O-Bar Feed Master you can automatically cut any quantity of identical lengths of bar stock with a modest investment. Or, a Wells-O-Bar Feed Master can be added to your present horizontal band saw to convert it to an automatic cut-off machine.

For operation the feed unit requires only air at 60 to 80 pounds pressure. Standard feed will project up to 17". The feed mechanism does not interfere with the use of the saw for making single cuts.

See your Wells Dealer for complete information or write direct.

The illustration above shows the Wells-O-Bar unit attached to a Wells No. 8 Saw. At the right is the unit attached to a Wells No. 12 Heavy Duty Machine.



Wells saws

Wells

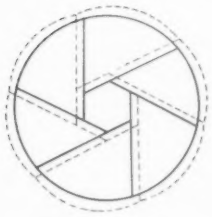
Products by Wells are Practical

METAL CUTTING BAND SAWS

WELLS MANUFACTURING CORPORATION
505 ROOSEVELT ROAD, THREE RIVERS, MICH

of tea, but, at the moment, we are not of the opinion that a definite break for tea would be offset by increased effort and production.

J. C. Campbell
Works Manager
Thos. White & Sons, Ltd.
Paisley, England



Cold-Drawing Dies

You mentioned a continuously adjustable cold-drawing die of six carbide segments (*AM*, May 14, p 210, see above). I am interested in obtaining information about it be-

cause I have built one, but my six segments are mounted in a hexagonal master frame, as shown in the sketch above.

Rino Fanardelli
Buenos Aires
Argentina

Information has been forwarded to Mr. Fanardelli.—*Ed.*

Nine Years Later

I am returning herewith the tear sheets from the 1942 issue of your good book containing the fuze-plant layout story.

You may be sure that at this time, nine years after the story ran, it is highly interesting to many of us. It was especially interesting to recall subsequent improvements in techniques and equipment. Your story is without question basically com-

Check the advantages of melting and remelting quality steel

with TOCCO Induction Heating

Several TOCCO melting furnaces may be operated from one TOCCO high-frequency power source.

- ✓ Extremely Rapid Melting
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- ✓ No Special Installation Charge
- ✓ Simple, Safe Operation
- ✓ Clean, Comfortable Working Conditions

Some Users of TOCCO High-Frequency Melting Furnaces

American Electro Metal Corp.
Haynes Stellite Company
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Union Carbide and Carbon Corporation
Allis-Chalmers Mfg. Co.
Watertown Arsenal
Wright Aeronautical Corporation
Watervliet Arsenal
Arwood Precision Casting Co.
Various Atomic Energy Plants and Laboratories

If any of these advantages suggest economies in your operations write us for full details—no obligation, of course.

THE OHIO CRANKSHAFT COMPANY
CLEVELAND 1, OHIO

TOCCO

Hardening • Brazing
Annealing • Soldering
Forging • Melting

for permanent serial numbering

Noblewest automatic numbering heads are a product of long experience. They are well-known for their dependability and long life wherever *permanent* serial numbering is required on steel and other metals, wood, fibre, hard rubber and plastics. Numbers are automatically advanced. Can be used in either marking presses or roll-marking machines. Applications include numbering on nameplates, machines and component parts. Noblewest numbering heads also furnish a direct reading at all times of the *exact* number of pieces marked—a valuable aid to production control.

STANDARD MODEL (at bottom of illustration) for serial numbering. Can be furnished in any size of numbers and with special characters as needed.

SPECIAL MODELS can be made in combination with dies (top of illustration) and to any other requirements including embossing and debossing heads. For prices write Noble & Westbrook Mfg. Co., 17 Westbrook Street, East Hartford 8, Connecticut.

MARK IT BEST WITH NOBLEWEST

EQUIPMENT FOR MARKING · GRADUATING · EMBOSSING · NUMBERING

plete and extremely useful, and, in view of this, I had some two dozen photostatic copies made for distribution to our plant people who are concerned with setting up our facilities.

Your kindness in digging this story out of the files and making it available to us is very much appreciated.

D. C. Peterson
Director of Engrg & Mfg.
Stewart-Warner Corp.

Amusing Musing

In looking over "Talking Shop" (*AM*, June 25, p145), I note the considerable trouble caused Packard by having to redraw a couple of thousand Rolls-Royce blueprints so they could be interpreted into our way of thinking. It seems nothing short of idiotic that two nations so alike in understanding and ideals should be so different in the means of expression in their industrial language!

While we have the heterogeneous mass of brainpower available, wouldn't it be a constructive move to have the United Nations establish a uniform standard—Russia willing—whereby all nations could benefit? Let the Englishman have his bloaters and tea while we relish in our flapjacks and java, but when we interpret what is wanted from a drawing, let us be universal.

Farther down the page I came upon a story of the cross-threaded executive who was afraid to sleep for fear someone would get hep to his job. Maybe the gadget in one of the shops where I used to work would help him. They had a large screw press used to try out finished dies. One of the more ingenious members of the staff equipped the large handwheel with an extension arm and from this arm he fastened a vertical handle. He also put a weighty cast-iron ball on the end of the arm, so momentum would give the necessary oomph at the proper time.

The operator had just given the handle a good yank when a fellow worker happened by to ask the operator if he had heard the one about the traveling salesman and the cockeyed school teacher. By that time, the handle had traversed its pi times diameter, and the old irresistible force met the immovable object, so the gullible chap was out cold for some time.

Such treatment wouldn't be as expensive, nor as painless, as twilight sleep, but it works!

Jack Everett
San Francisco, Calif.

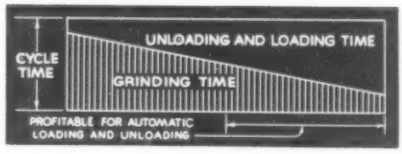
*What's in Vermont this month?**

AUTOMATIC LOADER CAN DOUBLE PRODUCTION AND HALVE COSTS

A manufacturer recently had the problem of increasing his internal grinding production without purchasing another machine. A study showed that a reduction of loading and unloading time was the only answer.

Bryant engineers specified an automatic loader and ejector, timed to unload as the diamond was dressing the wheel for the next work cycle. Production was increased from 160 pieces per hour to 320 per hour, and, at the same time, the operator was relieved of his major duties. Costs were cut in half.

Bryant Chucking Grinder Company is prepared to give you accurate figures on production and costs so that your management can translate them

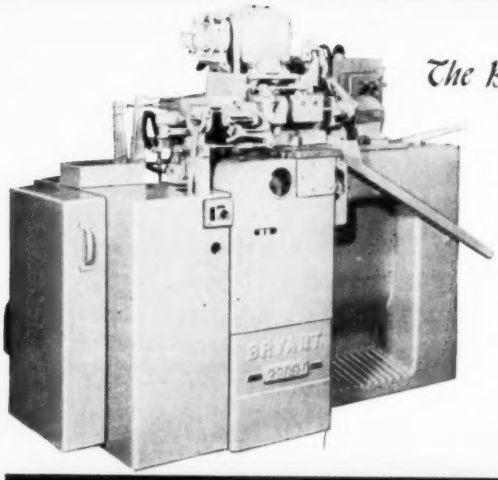


into terms of investment. Send your present production figures to Bryant now. We will give you data which may help you get that new automatic machine.

* Remember . . . it won't cost to inquire!

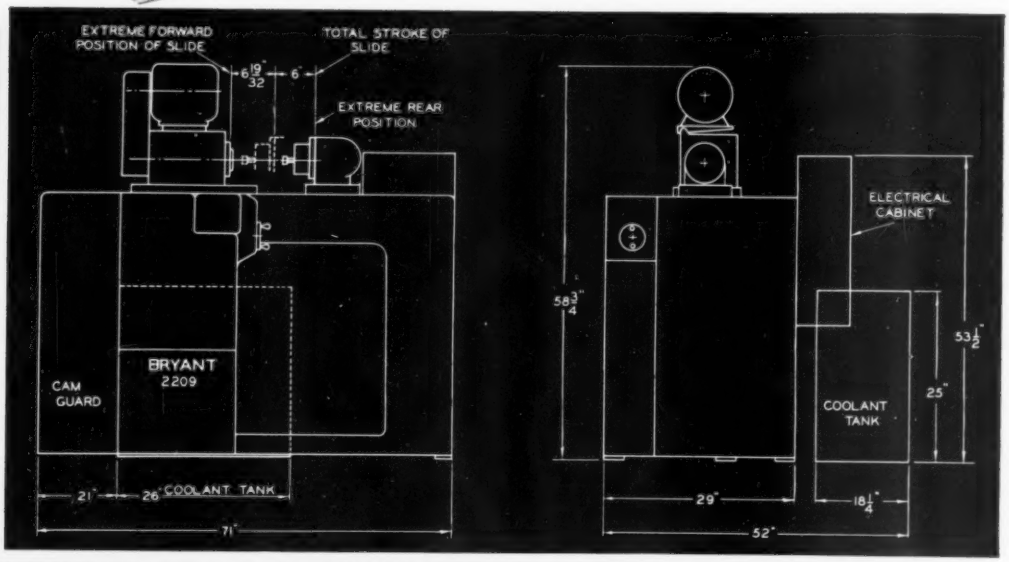
Bryant Chucking Grinder Company in Springfield, Vermont, U.S.A.

FOR HOLE GRINDING



The Bryant 2209-D Precision Hole Grinder

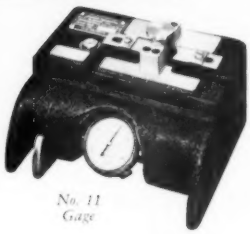
This machine is designed particularly for high production, precision grinding of bores from $\frac{1}{4}$" to 3" in ball bearing races, gears, rolls, bushings, etc. The entire cycle mechanism is a combination of cam and lever. The cycle is fully automatic as follows: load, rough grind, true wheel, finish grind, and unload. Automatic loading allows a single operator to handle a large battery of machines — his duties consisting only of loading hoppers and changing wheels. Wheel speeds up to 100,000 R.P.M. are obtained with the Bryant Hi-frequency wheelhead. Write for folder.



FOR QUANTITATIVE READING OF THREAD FIT

The Bryant Thread Gage

The Bryant Thread Gage gives one accumulated reading, on a dial indicator, of P.D., form and lead — a definite indication of assemble-ability! Drawings at left show the Bryant principle of an "expanding" master plug for checking internal parts, and a "contracting" master ring for checking external threads. The threaded part is dropped between (or over) the segments, operating lever is released, segment contact is made on all the threads, a partial turn of the part inspects the thread all over. *The Bryant gage is 4 to 6 times faster than plug or ring gaging.* Write for folder.

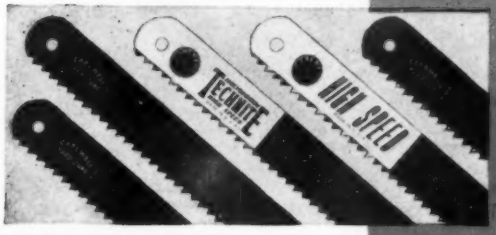


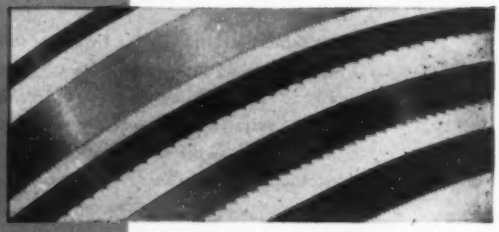
No. 11 Gage

Bryant Chucking Grinder Company in Springfield, Vermont, U.S.A.

1851 CAPEWELL

MADE WELL TO CUT WELL





HACKSAW BLADES

Power blades: HIGH SPEED, made of 18-4-1 tungsten high speed steel; TECHNITE, made of special alloy high speed steel; SAFETECH, high speed blade, softer backing for safety, shatterproof.

Hand blades: HIGH SPEED, TECHNITE, FLEXTUNG, FLEXLOY, *and* HARDTUNG; these five types available in two lengths, and four different tooth counts, cover every requirement from skilled tool room work to home work shop.

BAND SAW BLADES

Capewell Flexible Back Hard Tooth Band Saw blades for metal cutting are made from carefully alloyed and processed tool steel and only the full tooth is hardened, giving a tough, flexible body complemented by sharp, precisely set and hardened teeth. They are available in Contour saws, Cut-off saws and Skip Tooth saws. *Capewell Spring Temper* band saws are made from a tough, resilient alloy steel suitably hardened throughout. Capewell narrow Wood Cutting Band Saw Blades have proper hardness for clean cutting, yet the flexibility to stand bends and strains.

How's your S-I-Q?*

1. In power cutting with a hacksaw how many teeth should be in contact?
2. Should saw be tight or a little loose? (power cutting)
3. Why do hand hacksaw teeth break?
4. Why do hand hacksaw teeth get rounded?
5. Why do band saw blades break?
6. Why does a band saw sometimes cut crooked?

*(Saw Information Quotient)

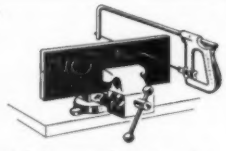
The answers

1. At least three; commence on greatest area — where most teeth are in contact.
2. Always tight — loose blades wear quickly and won't cut straight.
3. Frequently it is because tooth size is too coarse ... use blade with which three teeth touch work.
4. Usually misalignment or improper spacing of guides.
5. Blade slipping—use slower stroke. Heavier pressure on forward stroke.
6. By being twisted in the cut—because guides too far apart or misaligned.

BUY THROUGH YOUR DISTRIBUTOR

"DAFILES"

THE *new* 360° ALL PURPOSE SAW



"Dafiles" cut almost any material in any direction, fit Capewell or other standard hacksaw frames when used with Capewell Dafile-links; can be used for high speed cutting in power jig ... ideal wherever you have a radius cutting problem, the need for sharp turns, or intricate patterns to cut.

THE CAPEWELL MANUFACTURING CO.
65 Governor Street, Hartford, Connecticut

Gentlemen: Please send me more information on
☐ Hacksaw Blades; ☐ Band Saw Blades;
☐ Dafiles.

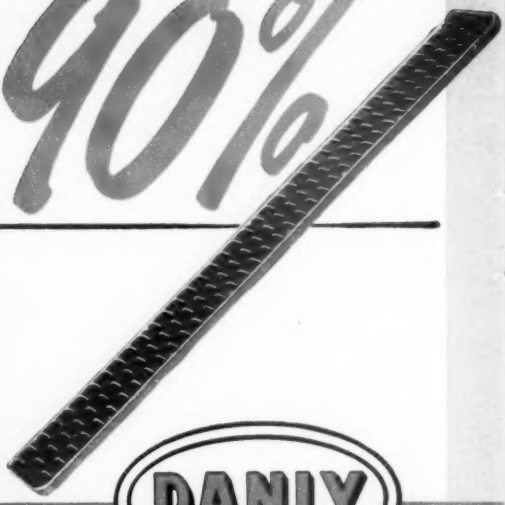
NAME _____

COMPANY _____

ADDRESS _____

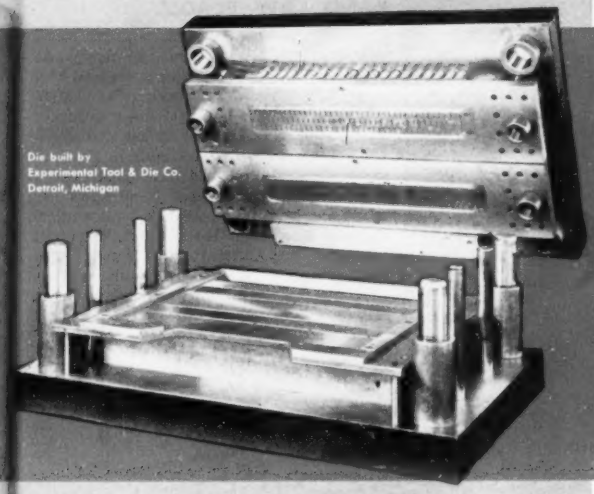
PIECE PART REJECTIONS REDUCED

90%



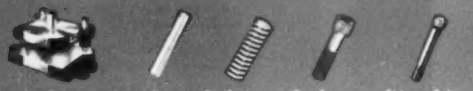
Diemakers at Experimental Tool & Die Company solved a costly repair soldering problem on these stamped radiator heads with the die shown below. Precision was the secret. Die tolerances were held to within .0001" and all die components had to be interchangeable. That's why they specified . . .

DANLY®



Die built by Experimental Tool & Die Co. Detroit, Michigan

DIEMAKERS' SUPPLIES and PRECISION DIE SETS



Die Sets · Dowel Pins · Die Springs · Cap Screws · Stripper Bolts

CALL ON THE DANLY BRANCH CLOSEST TO YOU FOR FAST LOCAL SERVICE

***CHICAGO** 50, 2100 South Laramie Avenue
***CLEVELAND** 14, 1550 East 33rd Street
***DAYTON** 7, 3196 Delphos Avenue
***DETROIT** 16, 1549 Temple Avenue
***GRAND RAPIDS**, 113 Michigan Street N.W.
INDIANAPOLIS 4, 5 West 10th Street
***LONG ISLAND CITY** 1, 47-28 37th Street
***LOS ANGELES** 54, Ducommun Metals & Supply Co., 4890 South Alameda
MILWAUKEE 2, 111 East Wisconsin Avenue
PHILADELPHIA 44, 18 West Chelten Avenue
***ROCHESTER** 4, 16 Commercial St.

**Indicates complete stock*

Diemakers everywhere depend on Danly precision. Every Danly product—die sets, dowel pins, die springs, cap screws, stripper bolts—is designed to complement the finest die work. For complete, reliable service, come to Danly!

DANLY®

DANLY MACHINE SPECIALTIES, INC.

2100 South Laramie Avenue, Chicago 50, Illinois

SPOT NEWS of Metalworking

- **Increases of several hundred percent in tool life** and better finishes are made possible at higher machining speeds by applying coolant in pencil-sized jet at 2000 psi from below to strike line between work and toolbit, according to research just completed.

- **"Longevity" demands are being made** on aircraft employers by International Association of Machinists. Under "longevity," worker gets an extra cent an hour for each year of service, up to 10 cents. Union threatens to strike on this point at Engineering & Research Corp.

- **Both U.S. and British machine tools are being built in Canada** under license. Other U.S. companies are looking into licensing plan to get these benefits: lower labor costs and freedom from import duties.

American maker of British-designed jet engine is seeking subcontractors in Europe. Such subcontractors might get sizable volume by shipping parts to both U.S. and English plants. Advantages are: reduction in manufacturing costs, and use of foreign raw materials instead of American.

- **Wage escalator clauses are needed in union contracts in tool and die shops** to keep skilled workers from being pirated by large companies with escalator-clause contracts. UAW-CIO is trying to force cost-of-living clauses in its contracts outside the automobile industry. It struck Aluminum Co. of America's Cleveland works for weeks on this issue, hoping to get test case for Wage Stabilization Board.

- **U.S. Air Force will begin on-the-spot selection of reserve machine tools** by aircraft contractors on July 23 at Marietta, Ga., and Omaha, Neb., storage sites. Selection heretofore has been largely from stock cards, with physical choice minimized. New procedure will mean greater accuracy in selection and faster deliveries. Each contractor seeking machines, however, must have his visit "scheduled" by Air Materiel Command.

- **Shortage of skilled labor is so acute in Canada** that at least one metalworking company is advertising in British newspapers for engineers, tool and die makers, and machinists. Jobs are guaranteed on arrival in Canada, but recruits must pay their passage across.

Deep holes ⅜ in. in diameter and 63 in. deep have been drilled in stainless with standard gun drills, only modification being increase of coolant pressure to 1200 psi to clear the chips.

- **NPA is getting so many requests for boron steels in trial lots** that it has asked alloy-steel people to report on available stocks. NPA has urged hand-tool makers to experiment with boron steels in making wrenches, pliers, and other hand tools. Locomotive makers have been experimenting with boron alloys.

- **Curtiss-Wright is reported looking for plant location** in Buffalo area to produce jet-engine blades by the shell-molding process.

- **NPA's new Class-B Product List** covering fourth-quarter CMP applications contains important changes from third-quarter list. Copies can be secured at Department of Commerce field offices.

- **Cut in price of titanium from $5 to $1 per lb** is claimed to be possible by development of new titanium production process as result of five-year research program by Office of Naval Research. Pilot-plant stage has been reached by Horizons, Inc., Cleveland, operating under ONR contract.

- **Super-fine steel tape 0.0005 in. thick** will be rolled on new cold-roll (Sendzimir) mill at Naval Ordnance Laboratory, White Oaks, Md. Strips can be made in widths up to 8.5 in. Mill will take strips 0.025 in. thick and roll them through oil-filled chamber. Mill weighs 6000 lb., is run by five motors. Uses of tape: pulse transformers, magnetic amplifiers, guided missiles.

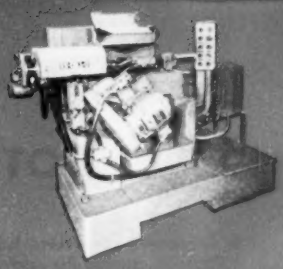
EX-CELL-O

Blade Machining Equipment

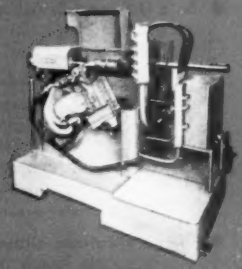
NOW AVAILABLE

Compressor blade for turbojet aircraft engine.

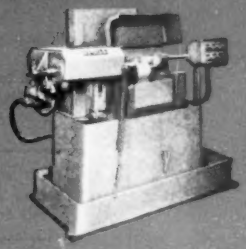
Three Production-Proved Machines Mill, Grind and Polish Airfoil Forms



Ex-Cell-O Precision Profile Miller, Style 86, mills the complete airfoil form including leading and trailing edges. Work is supported rigidly by back rests throughout the cutting stroke.



Ex-Cell-O Precision Profile Grinder, Style 87, grinds the complete airfoil form including leading and trailing edges. Work speeds change automatically during rotation as area of contact between wheel and work varies.



Ex-Cell-O Precision Profile Polisher, Style 88, polishes the airfoil form with an abrasive belt which passes over a rubber pulley at point of work contact.

The complex job of finishing the airfoil form of compressor blades for jet aircraft engines is now done speedily, accurately, and automatically by three Ex-Cell-O standard machines. Production-proved, these machines mill, grind, and polish, respectively, with completely automatic machining cycles. Operator merely loads, unloads, and pushes start button. For further information and specifications contact Ex-Cell-O in Detroit today.

EX-CELL-O

CORPORATION

DETROIT 32, MICHIGAN

MANUFACTURERS OF PRECISION MACHINE TOOLS CUTTING TOOLS • RAILROAD PINS AND BUSHINGS DRILL JIG BUSHINGS • AIRCRAFT AND MISCELLANEOUS PRODUCTION PARTS • DAIRY EQUIPMENT

Washington

Rearmament will continue at present pace, regardless of outcome of Korean negotiations. Yardstick will be military budget Congress approves. Budget will be cut—but not deeply.

• • •

Don't be fooled by congressional "economy" talk. Though it would like to, Congress doesn't dare cut military spending enough to reduce arms output substantially. Chances of war are still too great. And putting on real brakes would risk serious upheaval of the economy.

So Congress will hack away at non-production items like military construction, hiring of civilians. Military won't get all the $60 billion it is asking. The $8.5 billion for foreign aid, including weapons, will be cut to the bone.

• • •

It all boils down to about this: If you're working on a military order, or trying to get one, don't worry about a change of schedule. Congress won't clear the military budget for a month or two yet. But there'll be ample funds for hard goods when it does.

• • •

We've already fallen behind on rearmament, on basis of completed production. Mobilization boss Wilson estimates actual deliveries of military end items are 20% behind schedule.

Timewise, this adds up to a lag of three to four months. That's the average of time extensions being asked and granted on deliveries by military contractors.

• • •

But delivery bottlenecks are easing. They're similar to those we ran into in the tooling-up stages of World War II—shortages of right kinds of industrial equipment, unwillingness of the military to freeze specifications, lack of certain key components.

Military production will be in high gear by winter, Wilson thinks. By then he hopes to iron out most of kinks that are slowing deliveries now. Here are some of steps he is taking:

• • •

Machine tools have been labeled No. 1 bottleneck. The military blames them for lags in tank, aircraft, much other production. So Wilson has ordered all mobilization agencies, including the price controllers, to give all-out assistance to expansion of tool production.

• • •

Electric devices are holding up deliveries, too. Many were still being developed last June; and the military was slow to fix specifications. So Wilson told the Munitions Board to crack down on specs. It did.

Getting the right components at the right time will continue to plague the mobilizers. But Wilson counts heavily on CMP to ease this problem. CMP's intricate scheduling of all hard-goods production took care of the toughest components problems in World War II.

• • •

Machine tools are hit hardest by shortage of skilled and professional employees. Bureau of Employment Security survey for Wilson's office discloses 75% of companies are having difficulty meeting manpower needs.

Steps being taken to ease shortage: longer workweek, expansion of training facilities, lowering of hiring specifications.

Survey claims shortage is not yet impeding defense production seriously. Many plants still working on civilian contracts, too, but situation is worsening.

Manpower experts say shortage is confined to local areas. Immediate problem is to get skilled workers to shift to areas where needed. General labor shortage is anticipated next year when 20% of production will be for defense.

• • •

Look for special rules on salary adjustments to come from new Salary Stabilization Board. SSB must follow Wage Stabilization Board policies, but must adapt them to meet individual salary problems. WSB rules covering groups of workers are not generally applicable.

Salary questions WSB is digging into: Stock option plans, incentive bonuses, profit-sharing plans.

• • •

A new wage formula will continue to relate wages to cost of living, but Jan. 15, 1950, base date of the "catch-up" formula, may be discarded Wages may be allowed to rise as much as the increase in living costs since the last contract. WSB public members favor this.

• • •

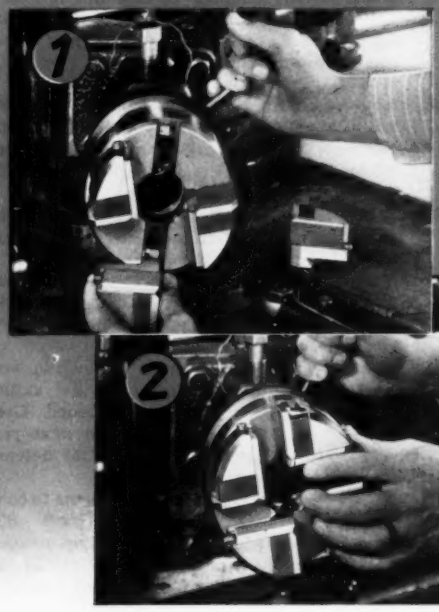
Don't worry about stories of overallocation under CMP. Last time, CMP planners found 5-15% of aluminum, copper, steel they allotted was never ordered by people who got allocations. So they regularly allocated more than the available supply, as they're doing this time.

We're really in trouble only on copper. Controllers allotted more than supply to military and essential users in third quarter, forgetting unallocated consumer durables. Fourth-quarter allotments will be pared, but by then consumer durable goods may be under CMP.

• • •

Help for small business in getting military orders is job of 200 specialists now employed by Army at many installations. Air Force and Navy are hiring similar experts. Write to Office of Public Information, Department of Defense, Washington 25, for name and location.

JUST ONE MINUTE



TO CHANGE MURCHEY CHASERS

1. Simply remove stop collar—take out chaser and holding block assemblies.

2. Insert blocks with sharpened chasers against positive locators —replace stop collar.

WHAT A TIME-SAVER—Downtime for changing chasers on other makes of tangent dieheads is from 15 minutes to one hour. *Only one minute is required to change over Murchey chasers on the job.*

WHAT A SETUP-SAVER—Machine operators change their own Murchey chasers which are already precisely pre-set in the holding blocks.

WHAT A CHASER-SAVER—By means of the Murchey tangent setting fixture, only a touchup grinding wheel cut is required to resharpen—a bare minimum stock is removed. Also, each chaser is positioned to take its full share of the cutting load.

WHAT A MONEY-SAVER—With Murchey chasers, the machine is down for change-over only, 1/15 to 1/60 of conventional change-over time. Setup is done separately by unskilled help when time permits. Murchey chasers wear longer.

5717

Write, wire, or phone for a Murchey "quick change-over" demonstration.

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Lower Cost per Thread MURCHEY

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Detroit

If Korean peace means cutbacks in military production, Detroit contractors haven't heard about it. From all they can glean, pressure will continue and mount from Washington.

"Remember," said one, "That some other country can blow up, too. Korean peace doesn't mean an end to the emergency—it means at best a breathing spell. We need one, too, till the end of the year."

• • •

Detroit employment today may be close to the conversion bottom. That will be true if findings of a recent Detroit survey are borne out by the facts. Against average employment of 535,000 in the Detroit area in the second quarter this year, third quarter payrolls are expected to average 465,000. Fourth quarter prediction: 470,000.

Projection for 1952, by quarters, are: 485,000, 500,000, 510,000 and 520,000. Of the 520,000 expected to be at work in the last quarter of next year, 70,000 will be on defense jobs. Today defense work is absorbing about 15,000.

• • •

The implication: today's 450,000 employed on automotive and related manufacturing will stay pretty constant during the next 18 months.

Current dropoff in jobs is confirmed from all over. The State Employment Security Commission predicts 75,000 idle in September, against 58,000 today. Ford forecasts further cuts in production this year, says it will be 1953 before its defense program is in top gear.

• • •

Why does industry come to Michigan? Why does it stay, or move away? The Survey Research Center of the University of Michigan has interviewed 200 industrialists to find out.

Advantages of a Michigan location: Nearness to market, availability of skilled and production labor, nearness to materials, liking for the state. Disadvantages: High labor costs relative to output per man hour, difficulties with organized labor, high local taxes, traffic congestion, lack of space for expansion.

• • •

Automobile sales in Wayne County (Detroit), supposed to portend national trends, were off about 15% in June compared with June, 1950.

Total for the first six months of 1951, however, is still a few thousand above 1950. Trucks in June were just about the same as last year. Used car sales were almost identical. The big decline in new car sales came in to the top priced group—Cadillac, Lincoln, Packard.

Output sagged over July Fourth holiday to the lowest rate in many months—about 100,000 cars and trucks, U. S. and Canadian plants included. The following week it rose, but failed to reach the 150,000-a-week and better clip of May-June.

• • •

Near-term schedules are going to be lower. Ford has announced cutbacks from present levels. Chrysler had layoffs of some 13,000 people in late June and early July; more will follow.

Nash got around layoffs—but not quarterly production totals—by a 2-week company-wide shutdown for vacations this month, the same plan General Motors has for August. Hudson was being impeded by day-to-day work arguments which reduced final assembly to a few hours a day.

• • •

Company notes: Kaiser-Frazer, with more steel than automobile orders, is getting into the contract manufacturing field. Its big press shop will make stampings for Fisher Body under a recent contract, using its own metal.

Willys: Last war it was the third largest producer of aluminum forgings. This time the company is moving headlong into the same field, taking over operation of Aluminum Forgings, Inc., Erie, Pa. Capacity at Erie: 2,000 tons of aluminum and steel forgings a month.

Chrysler: Is 30 days ahead of schedule on its Newark (Del.) tank plant; has another commitment for $91-million to set up a Navy plant and start production north of Detroit for jet engines.

Chrysler has built 25,000 of the new V-8 180 hp. engines, introduced early this year. Current output: 450 a day, and plans call for that rate to be held throughout 1951.

• • •

Bendix: Will build military requirements at the Montrose (Pa.) division, formerly owned by South Montrose Mfg. Co. Detroit Harvester: Is setting up a defense plant at Paris, Ky., fifth in its chain, mainly for aircraft parts.

Top speed of 125 mph with 125 HP costs $25,000 when you buy this model. Designed by William Flajole and intended for use in a Johnson's Wax contest, the speedster stands only 38 in. high, is 66 in. wide, and weighs 2700 lb. Engine is a modified "Dual Jetfire" Nash 6-cylinder plane with 8.1- to 1-compression ratio

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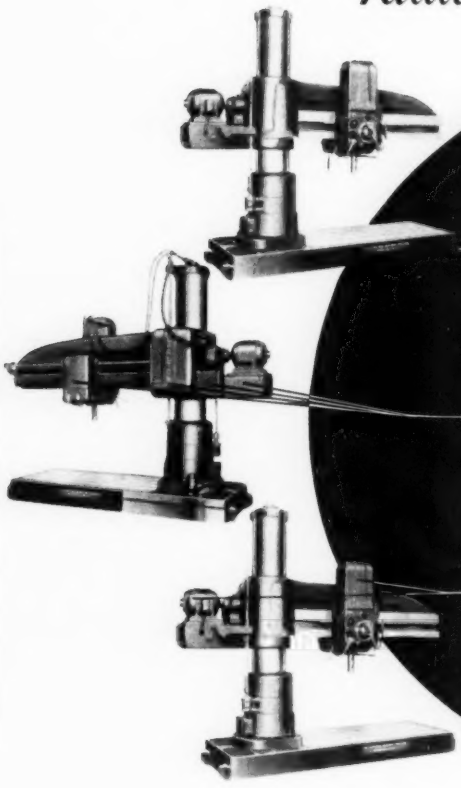

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THE CARLTON MACHINE TOOL CO.

Machine Tools

Defense Mobilization Director Charles E. Wilson created a real flurry in Washington with his recent machine-tool directive.

The directive, addressed to all defense agencies, made the point that machine-tool production must be expanded quickly and sharply.

"The cost of the delay in waiting for machine tools will far exceed the cost of the tools," he stated.

• • •

Here are the things that must be done, the directive said: a better price formula, financial relief, pool orders in much bigger volume, assistance in getting manpower.

A week before the directive came out, UAW-CIO president Walter Reuther caused a stir by submitting directly to Mr. Truman his own plan for "breaking the machine tool bottleneck."

Wilson and Reuther agreed on at least one point: machine tools are the defense bottleneck.

• • •

First action stemming from Mr. Wilson's edict was a new OPS price order—General Overriding Regulation 15—providing a new price formula for the machine-tool industry.

OPS presented it to the industry's task force as an accomplished fact. It then was issued despite its obvious defects.

• • •

A machine-tool builder may adjust his ceiling prices, under GOR-15, either on an overall basis or for a particular machine tool or attachment.

He may reprice his line to realize 80% of his average rate of return in the 11 years, 1938 through 1948. The rate of return means net operating income, before income and excess-profits taxes, plus interest paid, divided by total assets used in the business.

The builder must recalculate his prices every three months and adjust his ceilings on the basis of his experience.

If, at the end of each 12-months' period, the builder finds that he has priced his machines more than 5% above the ceiling, he is compelled to refund, within 60 days, the entire amount of the excess to his customers.

• • •

For a particular machine tool or attachment, a builder may secure a price adjustment to realize total unit costs plus 5½% profit.

The standard used in GOR-15 is the same one used by Bureau of Internal Revenue in determining excess profits for the machine-tool industry. It recognizes the fact that the industry was "depressed" before Korea.

• • •

Formula under GOR-15 has one glaring weakness. The return is based on assets without relation to dollar volume of sales. A builder might double his dollar output and make not a cent more than he does now after he readjusts his prices under the formula.

GOR-15 is elective and not compulsory. Some builders may decide that they are better off to operate under the General Ceiling Price Regulation or under CPR-30 (though few filed under latter prior to its suspension).

• • •

Pool orders for machine tools are to be greatly expanded. Top defense people say the funds are at hand without getting fresh Congressional appropriations.

But pool orders still will be dished out on a selective basis—to companies making so-called critical machines. The machine-tool industry will not be blanketed with them.

Means are to be found for advancing 30% in cash with pool orders. Armed services are to be encouraged, too, to make 30% advance payments on machine tools for their contractors.

Hereafter, no publicity will be given to builders with pool orders until orders are accepted.

• • •

Mr. Wilson is said to have had plans for setting up a Machine Tool Production Board, similar to boards now functioning in aircraft and electronics industries. But one of his most powerful associates persuated him it was not necessary. In fact, this particular associate is "burned up" about the machine tool directive. He regards it as going too far.

There is speculation in Washington whether Mr. Reuther's letter to the White House was responsible for precipitating the directive.

• • •

British schedules of purchases of U.S. machine tools begin to shape up to a total of about 7000 units. The twelfth schedule arrived in Washington recently, with only 100 machines on it. They were more than offset by cancellations.

Only in cases of great emergency will the British be granted machines from the 70% allotted to our armed services under M-41.

There is bound to be some shifting about of British orders the next few months, with certain machines cancelling out in favor of others.

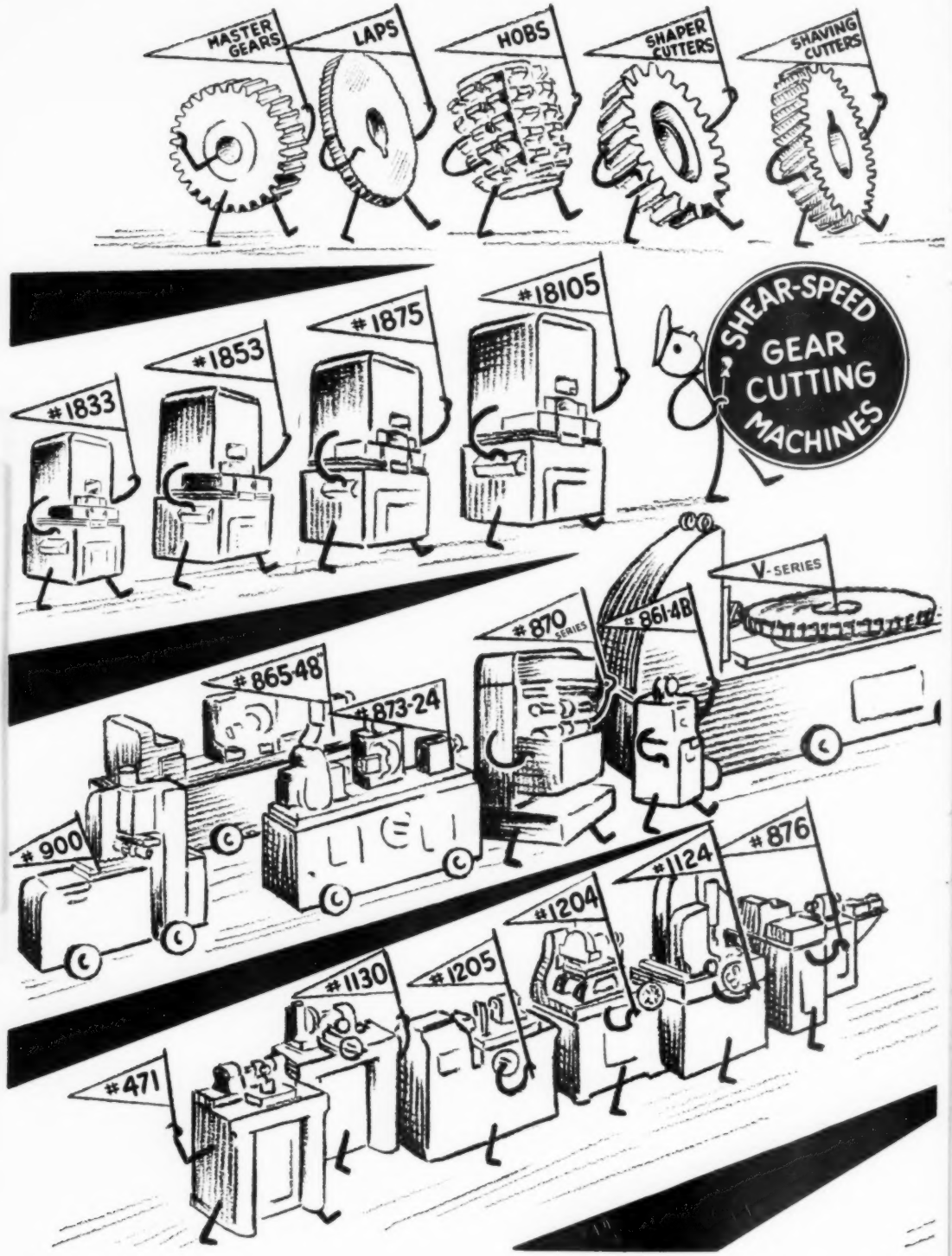
• • •

French orders for U.S. machine tools are reported to include around 1000 units. Some 700-800 have been given DO ratings.

The total runs about $15 million, with $9.5 million going for metal-cutting machines and remainder for presses and metal-forming units.

• • •

Metalworking Equipment Division is now a separate division of NPA. It no longer is part of General Industrial Equipment Division.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#1853
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V-SERIES
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(*) plus some omitted for lack of space.

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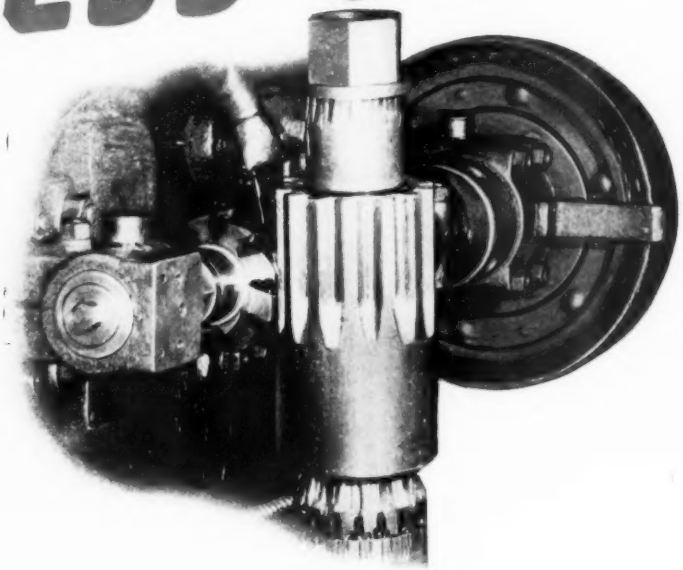

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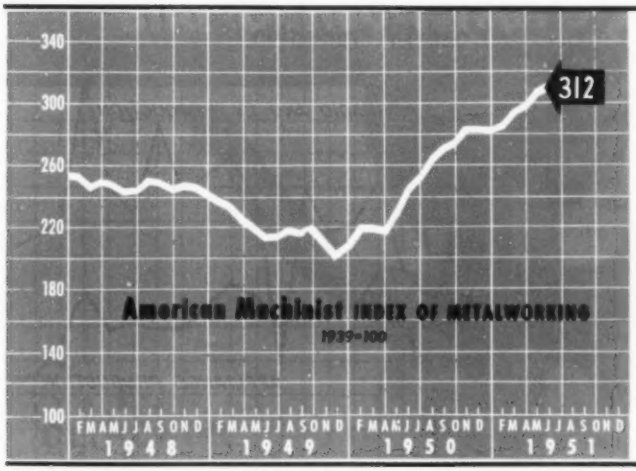
Gaging Metalworking



INDEX

BASED ON MANHOURS WORKED IN THE FIVE COMPONENTS

	JUNE '51	MAY '51(p)	APR. '51(r)	JUNE '50
	312*	309	307	258
Machinery	304	299	234	
Electrical Manufacturing	357	353	289	
Automobiles, Trucks	240	250	260	
Transportation Equipment	374	362	225	
Other Metalworking	323	320	273	

* Estimated (p) Preliminary (r) Revised

Metalworking Dips From Postwar Peak

July and August Metalworking operations will be off from the June level. AMERICAN MACHINIST index (based on manhours worked) will drop this month for first time since November, 1949.

• • •

Many factors contribute to the downturn. Some of them are: (1) over-production of consumer goods, (2) materials shortages, (3) vacation shutdowns, (4) conversion period when many plants are in between civilian goods and arms production.

• • •

There is no denying the influence of the prospective Korean settlement. Managements are more cautious in making commitments. They would like to work off inventories somewhat. There is less certainty about Metalworking's going to new postwar peaks.

Bear in mind that even now Metalworking is running at more than three times the 1939 rate.

• • •

Everyone is guessing whether the defense program may be cut back or at least spread over a longer time. The latter appears a sure bet if pressure of emergency is removed.

The fact is that cancellations of military-goods orders are very remote. Defense load on industry promises to increase in next six months rather than decrease. That is why Metalworking promises to prosper the latter half of this year, despite setbacks in other directions.

Here is a quick rundown of various segments in the metalworking field:

Aircraft—is set to triple its deliveries of planes and engines as soon as possible. This ambitious program is sure to carry through. It's the biggest chunk of defense production.

Heavy machinery—backlogs are huge in many lines, such as construction machinery and tractors. No letup is looked for.

Freight cars—strikes have put a crimp in output. They may drag out awhile. Even if settled, decreased steel allotments under CMP will keep production well below recent high levels.

• • •

Appliances—smaller makers are suffering most from heavy inventories. Output is down 30% from a year ago. Certain manufacturers have closed plants beyond normal vacation time, hoping to get enough orders and raw materials to resume work. They also are trying to swing subcontracting defense orders. Appliance companies which took defense business reluctantly now are pretty happy about it.

Automobiles—the industry is suffering from sales resistance. If Washington had not curtailed use of materials, car assemblies would have had to be slashed anyway.

Don't raise your hopes about an easing of the materials situation. Enough people want steel that there will be a mad scramble for it the remainder of this year.

Gaging Business

A dip in general business is on the way this summer. But it won't be serious. A good guess: only 3% or 5% at most.

It isn't likely to last long. By end of the year output may be higher than current levels.

• • •

Federal Reserve Board's Index of industrial production has been hovering around 222 since February. Come September, it may go down to 215. But many economists expect it to stage a sharp recovery in fourth quarter. It may touch 225 in December.

• • •

Industry's projected spending for new plant and equipment shows no "scare" tendency as result of Korean cease-fire. Check-up by McGraw-Hill since Korean settlement was first publicized reveals that industry expects to spend more than it indicated when it was queried at beginning of this year.

• • •

Inflation appears to be checked for a time by the promised end of the Korean campaign. That inflation was less a problem was apparent even before cease-fire talk — when consumers failed to buy or defense production to rise.

Consumers' price index may go down a bit the next few months. Food prices will drop seasonally. But opinion is that index at year's end will be 2-3 points above May's 185.4.

Wage rates aren't apt to go up much in final half of 1951. Washington thinks 3-4 cents an hour.

• • •

Manpower shortage will be greatest in '52. So far it has not been as critical as anticipated.

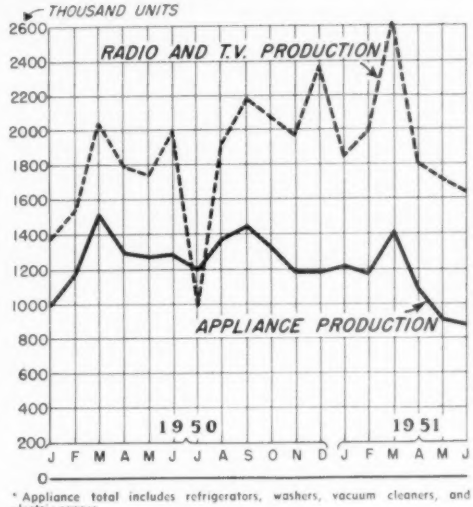
If defense production keeps rolling, about 4.5 million more people must be added to factory forces. That means that by next year 2 million more workers will shift from civilian goods to defense work. Net addition from outside labor force: 1.5 million workers.

• • •

Inventories of consumer goods accumulated at $4-billion-a-year rate in the past three months. Much liquidation is expected this quarter.

Physical volume of construction work in first half of 1951 was up from last year.

Appliances* Vs Radio and TV Production



* Appliance total includes refrigerators, washers, vacuum cleaners, and electric ranges.

WEEKLY BUSINESS INDICATORS

	Latest Week	Preceding Week	Year Ago
Business Week Index of Activity (1923-1925 = 150)*	233.1	234.0	216.3
Steel ingot production (thousands of tons)	2,029	2,015	1,830
Electric power output (million kilowatt hours)	6,077	6,898	5,380
Production of automobiles and trucks	102,127	156,105	137,731
Engineering construction awards (*Engineering News Rec.*, millions)	$361.0	$404.7	$365.0

MONTHLY BUSINESS INDICATORS

	Latest Month	Preceding Month	Year Ago
Refrigerators, sales (thousands of units)	348	446	550
Vacuum cleaners, sales (thousands of units)	202	227	279
Washers, sales (thousands of units)	254	292	305
Household electric ranges sales (thousands of units)	110	123	145
Radio production (thousands of units)	1,373	1,337	1,248
Television production (thousands of units)	339	469	486
Gear sales index (1935-1939 = 100)	667.1	742.5	363.1
Foundry equipment, new orders index (shipments 1937-1939 = 100)	431.7	490.1	294.9

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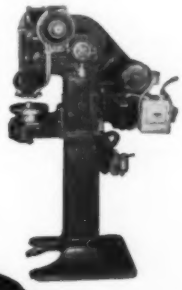
T-J RIVITOR used for automotive clutch plate assembly. Saves time and labor doing a four-fold job —assembling, setting, inspecting and ejecting.



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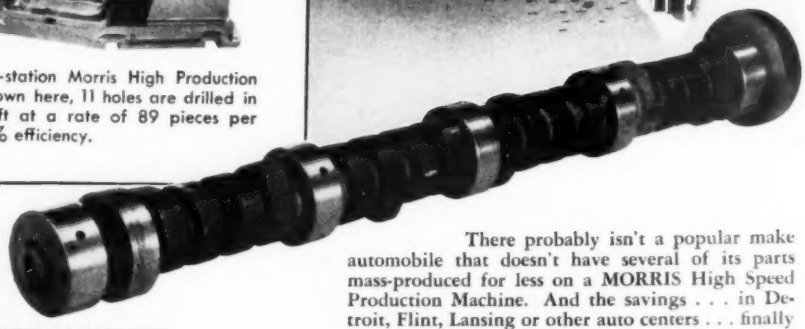
On the six-station Morris High Production Machine shown here, 11 holes are drilled in this camshaft at a rate of 89 pieces per hour at 80% efficiency.



OPERATIONAL SEQUENCE

Station 1—Load and unload
2—Drill two 3/16" holes part way
Drill one 3/16" hole to depth
3—Drill two 3/16" holes through
4—Drill one ¼" hole through
5—Drill two 3/16" holes part way
Drill one 3/16" hole to depth
6—Drill two 3/16" holes through

TOTAL . . . 11 operations

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American Machinist

MAGAZINE OF METALWORKING PRODUCTION ★ ESTABLISHED 18[illegible]

Are Machine Tools the "Bottleneck"?

Machine tools once again have the dubious honor of being dubbed "the bottleneck" of our defense production program.

There has been much scurrying around Washington lately in an effort to do something about the machine-tool industry. And now along comes Walter Reuther with a grandiose scheme for ending the machine-tool shortage.

Mr. Reuther didn't bother to present his plan to any of the small fry. He sent it direct to the White House.

It calls for central assembly plants around the country in which components produced in hundreds of small shops would be assembled into complete machines.

THE IRONY of the situation is that all of the present "viewing with alarm" could easily have been avoided if Washington officialdom had its present sense of urgency long ago.

Let's look back for a moment at World War II. The machine-tool industry then expanded its output more than sixfold. It achieved this superb record by adding extra shifts, working overtime and sub-contracting extensively. A practical and fair price freeze was instituted.

Pool orders were widely distributed to builders to enable them to set up bigger production runs and to subcontract. And 30% in cash was advanced with the orders, thus helping builders to finance their ballooning business.

WORLD WAR II experience, however, apparently taught Washington nothing. Look at the dismal record since Korea:

Defense orders were very slow coming in after the Korean invasion. They were a mere trickle until almost the end of last year.

Meanwhile topside defense officials said that machine tools were no more important than pots and pans. Pool orders were doled out with a teaspoon instead of a ladle. Builders were left to shift for themselves in financing their growing volume.

But worst of all, the price controllers dragged their feet. They refused for many precious weeks to allow extra costs for subcontracting, for overtime and for shift premiums.

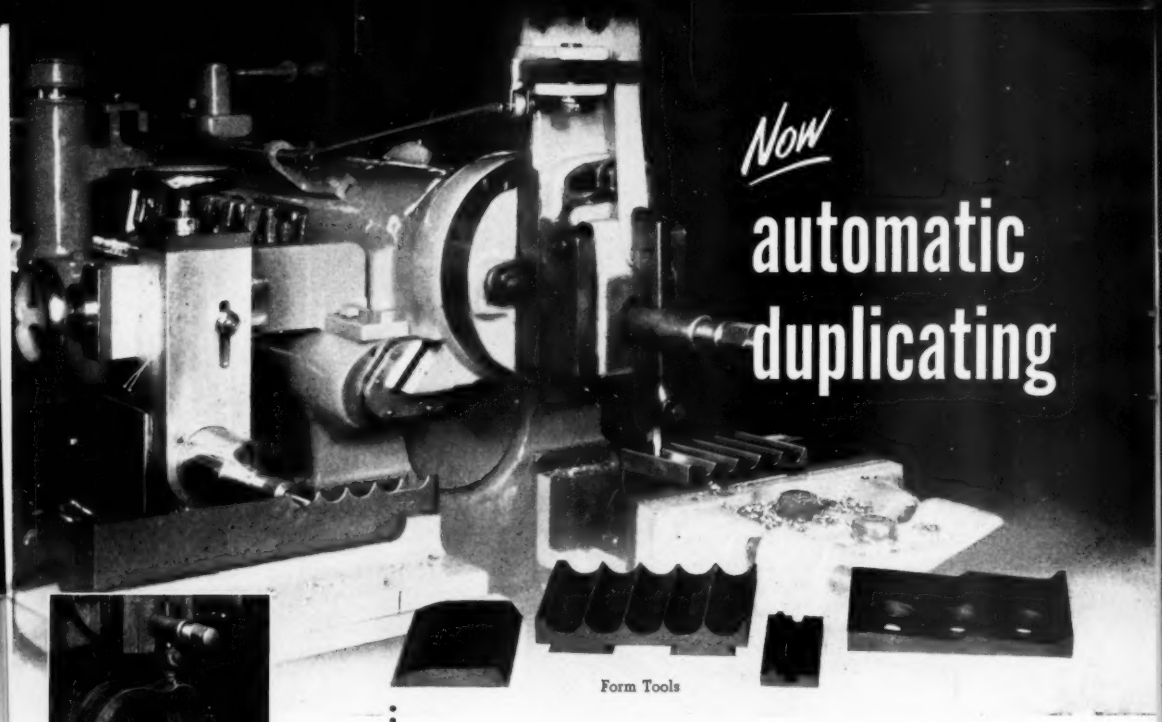
They insisted upon a rollback which put the base price of machine tools in a pre-Korean era when prices were depressed because the industry was depressed.

Finally Washington's top brass has awakened to the disastrous course that has been consistently pursued up to now. And the machine-tool industry is to get the price relief and other help needed if it is to do the mighty job cut out for it.

THE TRUTH is that there is nothing wrong with machine-tool production today that could not have been righted months ago if Washington had acted with intelligent dispatch.

Now that the help appears to be at hand, the machine-tool industry can be counted upon to do an efficient job of producing the critical machines required by defense plants, all with the assistance of subcontractors. And it will be done without resort to the clumsy, expensive and impractical plan which Mr. Reuther has suggested.

Burnham Finney



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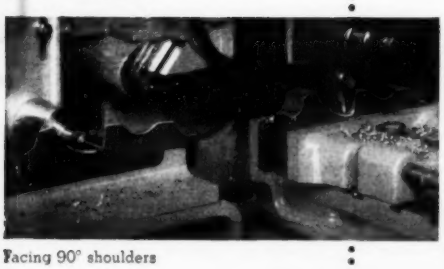
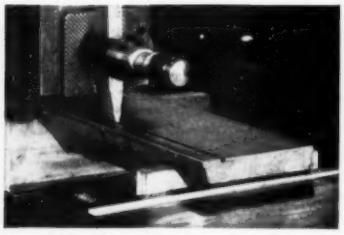
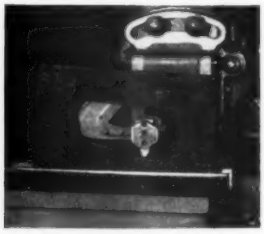


Facing 90° shoulders



Interchangeable molds



Duplicating internal contours

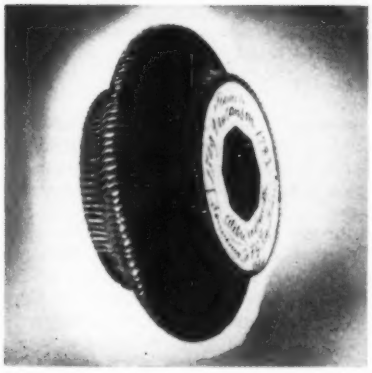
THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO, U.S.A.

SHAPERS · SHEARS · BRAKES

HOW TO MILL PROFITABLY WITH HSS CUTTERS

Higher productive capacity and lower costs follow sound application of available tools—essential if we are to maintain our national security



◀ 1 . . . This early milling cutter, produced by Jacques de Vaucanson, the eminent French mechanic, before 1782, seems more like a rotary file than our modern milling cutters, in which each tooth is designed to remove a substantial chip. Cutting teeth, which appear to have been produced by chipping, approximate gear teeth

▲ 2 . . . For high-speed milling, arbor yokes should be used, outer braces clamped, a copious supply of coolant provided, and guarding like that in Fig. 4 applied to prevent coolant splash

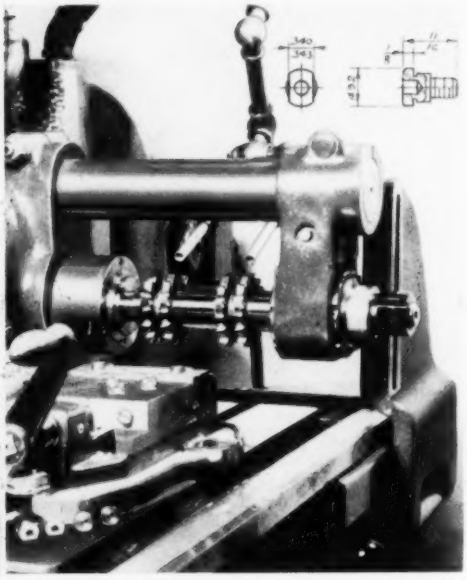
BY A. WILLIAM MEYER, Director of Research
BROWN & SHARPE MFG. CO.

APPLICATION of higher milling speeds with appropriate feeds is important from several standpoints. Increased speed can improve the finish on the product, can produce an equally satisfactory product in a shorter time, can, in some instances, show a saving in power and with good setups utilize existing machines to better advantage.

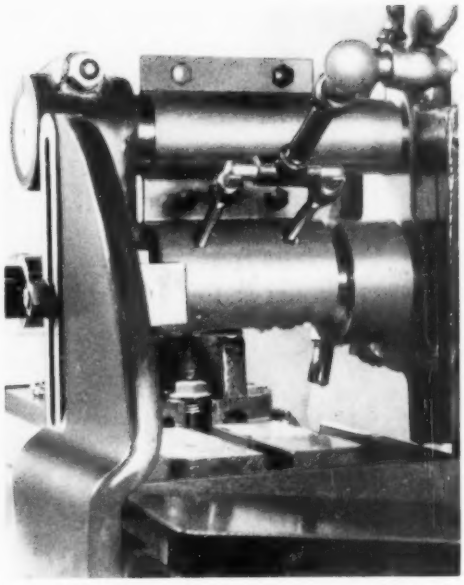
Machines and cutters have both changed in many respects over the years. To see how far we have progressed, just glance at an early milling cutter, Fig. 1. The cutters we have today are of better materials; we have a fuller understanding of their heat treatment; and we have generally improved design and methods of manufacture and maintenance.

Improvements which contribute to successful high-speed milling stem from machines as well as cutters. We have advanced machine designs which permit higher speeds and feed, provide more power to allow removal of more stock at faster rates, can do successful climb milling as well as conventional milling. We also have better application of coolants, faster-loading fixtures, and many machine-operating features contributing to reduced operator fatigue, so important to recognize when fast cycles of machine operation are employed.

It is well to review present milling practices and to consider if they reflect the optimum conditions and are productive of the most satisfactory and economical results. In many instances, greatly increased feeds and speeds can be used with success with standard cutters; with some refinements, even further increases are possible in some cases.



3 . . . Double flats are high-speed milled on two SAEX1112 studs at once with four, 14-tooth staggered-tooth, side-milling cutters 2½ in. in dia, and 5/16 in. wide on a ¾-in. arbor. Normally flats would be milled at 80 to 90 fpm and 5 ipm feed. Here cutters are operating at 365 rpm—238 fpm—with 24⅞ ipm feed (0.00476 ipt)



4 . . . Coolant lines and coolant guard over cutter in the operation of Fig. 3. One coolant nozzle is directed at each pair of cutters. Excellent work finish is produced by conventional milling, with gross production 480 pieces per hour

An interesting example of slab milling at elevated rates is on SAE 1120 steel rectangular bars 1¼ x 2¼ x 12⅛ in. long. These components are received in lots of 100 pieces and normally were milled at 115 fpm using 7-ipm feed, taking a cut 0.090 in. deep.

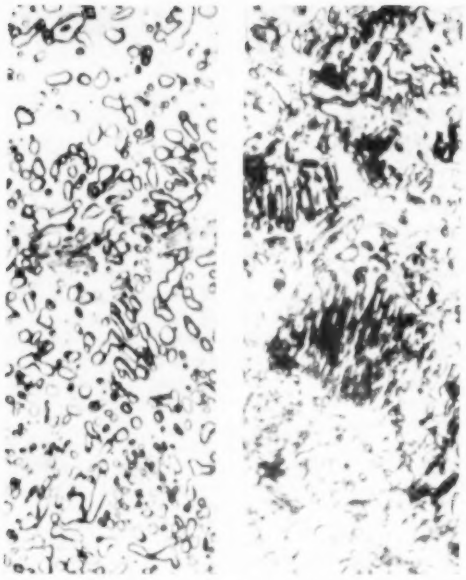
A standard coarse-tooth slab-milling cutter 3 in. in dia having 8 teeth of 10° radial rake and 30° axial rake, with 1¼-in. hole, was selected to mill the four flat side surfaces. The cutter was operated at 275 fpm, using climb milling with feed of 22½ ipm, an advance of 0.008 ipt, with depth of cut 0.110 in. and produced very satisfactory work. Two components were milled at a time on the 2¼-in. sides and four at a time on the 1¼-in. edges for a total of 1800 linear inches of milling. The cutter had an average wear land of only 0.005 in. at the conclusion of this run.

The work was also produced at faster rates of 342 fpm using 28 ipm feed and even operating at 534 fpm using a table feed of 70 ipm, but there was not much over-all gain in operating at these higher rates even though they appear attractive. It is always important to give consideration to the loading time and its relation to the cutting time in double-fixture milling, as it is highly desirable to arrive at a cycle that permits an operator to work conveniently, without unduly impairing cutter performance, yet, utilize the machine under efficient operating conditions.

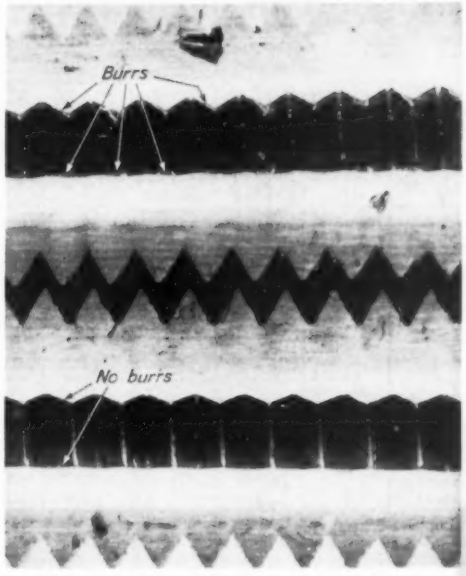
On this particular job, the 22½-ipm feed was very satisfactory. Cutting time was slightly in excess of loading time, so an operator could load comfortably while cutting took place. This represented a marked gain over the former production based on 7-ipm feed.

In this respect, it is perhaps noteworthy to point out that increases in feeds are in no sense direct proportion of the production increase. Handling and loading, without special fixtures for automatic loading and aids in handling usually require a fixed unit of time. Thus, although cutting rate may be increased several times, no such increase is reflected in rate of production. The relation between increase in feed and in net production when changing from a low rate of milling to a higher rate is shown in the table (page 124). On extremely long production runs that warrant cost of expensive tooling, considerable production increases are frequently possible.

Another application of HSS cutters at elevated rates is in slab milling high-carbon tool-steel racks. This was formerly done at 115 fpm and 5⅛-ipm feed. The operator employed conventional milling and held two racks in a vise at a time. This setup was changed so an 8-tooth, 3-in.-dia cutter 4 in. wide was used having 10° radial rake, 30° spiral. This cutter was operated at 134 fpm with 14-ipm feed rate—an advance of 0.010 in. per tooth. Climb milling was used, and three racks were clamped in the vise at a time. Approximately 8¼ cu in. of material were removed per minute and 8¼ hp were



5 . . . Sometimes a change of material condition permits faster and better runs. At left is an essentially 100% spheroidized carbon steel originally used in taps. By shifting to the approximately 50% spheroidized-50% pearlitic structure at right, burrs were reduced (Fig. 6) and 50% more taps produced per cutter sharpening



6 . . . Carbon-steel taps, $\frac{5}{8}$ in. in dia, fluted at 5 ipm, were heavily burred as at top. When material was changed as in Fig. 5, burrs were practically eliminated, although feed was increased to 70 ipm (conventional milling from end toward shank with a 2⅝-in. cutter at 240 fpm)

consumed in taking the cut. The finish on work at the higher rate of operation was better in appearance, cutter performance good and the gain in production by stepping up feed rate from 5⅛ to 14 ipm while milling 3 pieces at a time instead of two, is clearly apparent.

Satisfactory milling at elevated rates requires some attention to setup; merely stepping up feeds and turning the cutter over at a faster rate do not assure success. In the milling of the steel racks, for example, the machine was originally operated without the outer support. Only one arbor yoke was mounted on the overarms and this was not located to best advantage. Coolant flow was aimed in the general direction of the cut; what did not run off at the sides before reaching the cutting zone was of some benefit, a condition encountered all too often.

At the higher rates, the setup was changed as shown in Fig. 3. Here we see two arbor yokes used to advantage, also the outer brace is clamped in position to lend rigidity to the cutter. The coolant nozzle is also placed on the cutting side to be close to cutter and work and delivers a generous volume of coolant at the cutting zone. In some operations it is advisable or essential even to apply coolant at both sides of the cutter, and in all cases it is important that coolant nozzles distribute the coolant over the entire width of the cut. Less will "starve" the operation; more may create a deficiency of coolant where it is needed. When copious supply of coolant is applied at high spindle speeds, it is imperaant where it is needed. When copious supply of coolant is applied at high spindle speeds, it is imperative to have it fully flowing at the time when the cutter enters the work, for even at this point the momentary lack of sufficient coolant can cause cutter failure. It also becomes essential to enclose the cutter as shown in Fig. 4 to prevent the coolant from being unduly thrown about.

The use of high-rake-angle cutters is interesting, for increase in this angle can show savings in power. Cuts have been taken on SAE 1021 steel logs, 140 Bhn, 1 in. wide, ⅛ in. deep, and 15 in. long at 428 fpm, climb milling with 54-ipm feed—0.0124 in. advance per tooth. The cutter used had relatively high rake of 25° and a 20° axial rake. When the run was terminated at 78 cuts, the cutter was in good condition with a wear land of only 0.018 in., so only a nominal amount of stock was necessary for removal at resharpening. This cutter at the end of its run consumed approximately 6¾ hp in removing 6¾ cu in. of material per minute. The identical run, made with a similar cutter having 10° radial rake and 30° axial rake, raised power consumption to 8¾ hp, or approximately 30% more than that required by the higher-radial-rake cutter. Generally speaking, changes in axial rake show no advantage from standpoint of power saving, although increased spirals do have tendency towards smoother cutting action and avoidance of chatter. (*Next page, please*)

How Increased Feed Affects Production

CUTTING TIME / TOTAL TIME (For Normal Milling) ↓ \ (For High-Speed Milling) →	.10	.20	.30	.40	.50	.60	.70	.80	.90
.90	1:81 1:9	1:36 1:8	1:21 1:7	1:13 1/2 1:6	1:9 1:5	1:6 1:4	1:3 3/4 1:3	1:2 1/4 1:2	0
.80	1:36 1:4 1/2	1:16 1:4	1:9 1/3 1:3 1/2	1:6 1:3	1:4 1:2 1/2	1:2 2/3 1:2	1:1 5/7 1:1 1/2	0	
.70	1:21 1:3	1:9 1/3 1:2 2/3	1:5 4/9 1:2 1/3	1:3 1/3 1:2	1:2 1/3 1:1 2/3	1:1 5/9 1:1 1/3	0		
.60	1:13 1/8 1:2 1/4	1:6 1:2	1:3 1/2 1:1 3/4	1:2 1/4 1:1 1/2	1:1 1/2 1:1 1/4	0			
.50	1:9 1:1 4/5	1:4 1:1 3/5	1:2 1/3 1:1 2/5	1:1 1/2 1:1 1/5	0				
.40	1:6 1:1 1/2	1:2 2/3 1:1 1/3	1:1 5/9 1:1 1/6	0					
.30	1:3 5/7 1:1 2/7	1:1 5/7 1:1 1/7	0						
.20	1:2 1/4 1:1 1/8	0							
.10	0								

Production ratio (upper figure) and **feed ratio** (lower figure) between high-speed and normal milling on the same job, with the same loading time. Normal milling is 1 in each case. "Total Time" is floor-to-floor time per piece; "Cutting Time" is the time the machine is in feed. For example: With normal milling CT/TT = 0.7, and in high-speed milling CT/TT = 0.2. At the intersection of these two columns, the feed for high-speed milling is 9 1/3 that for normal milling, but net production is only 2 2/3 times that for normal milling

Another operation of interest involved the use of HSS shell end mills for rough-milling SAE 4640 blanks that are 2⅛ in. square x 9¼ in. long, 200 Bhn, to a depth of 0.085 in. Common practice was to use a duplex milling machine running at 70 rpm, using 8½-ipm feed, facing opposite sides on work in one operation. To improve and speed up production, the standard cutter having a 45° bevel was changed to provide a 30° bevel, and a feeler 0.010 in. thick was located between the cutter slide and the upright to tilt the cutter slightly and prevent the leaving side of the cutter from marring the milled finish. Under such conditions and with double coolant lines to the cutter, good results were obtained operating at 160 rpm using a 17¾-ipm feed.

The same operation can also be well performed on a single-spindle machine with slab-milling cutters and double milling fixtures. This material was successfully milled over a wide range of elevated rates using a 3-in.-dia cutter operating from 110 to 534 fpm and using appropriate feeds from 13 to 70 ipm. Taking the loading time into consideration, however, it was found that running at 169 fpm utilizing 18-ipm, (0.0105 ipt), that good all-'round operating conditions prevailed. With a fast continuous cycle of operation, it is helpful to have quick clamping or air-operated fixtures to avoid operator fatigue, also to have the work brought to, and taken away from, the machine at table height.

An instance where higher speeds of operation have been combined with the oft-neglected aid in better material structure is to be found in the fluting of taps.

Faster operation and better runs were obtained by changing the material structure from essentially 100% spheroidized condition (Fig. 5), to approximately 50% spheroidized-50% pearlitic. With the original slow milling, heavy burrs were common and decidedly objectionable on the milled blanks, and the average run was approximately 105 taps—420 grooves per cutter sharpening. Under the revised higher conditions, an average of 160 taps—640 grooves—were produced per cutter sharpening, and with practically no burrs whatever (Fig. 6).

Foregoing examples serve to illustrate the successful results that may be obtained by proper application of HSS cutters to highspeed milling for various operations. There are without doubt many operations of a similar nature in almost every shop. Each such instance presents an opportunity to increase production likewise if the same care and attention is given to setup, cutter selection, and condition of the structure of the material.

Tips FOR TOP SHOP MEN

395 When you're set to blast somebody, put the points you'll make down on paper, then read it to yourself as the guy on the receiving end. Are you being entirely fair—or getting the other guy down and jumping on him?

396 The way to a man's heart is still through his stomach—and plant cafeterias and lunchrooms are a chronic weak spot. Keep them clean, light, and painted and equipment up to date. Provide food suited to the work and the employees.

397 Change safety signs and other slogans regularly. Don't assume that, because they're there, they're read. Any sign or bulletin promptly becomes stale and familiar, thus loses its effectiveness.

398 No plant or department *has* to be dirty. Yours will be dirty only if you let it be.

399 Outline aisle limits, passageways, safe heights—and see that they are maintained and observed. Obstructed aisles are inefficient and dangerous.

400 Windows, paint and lights all lose their efficiency if they are not kept clean. Follow a regular washing schedule—and watch the men follow your lead.

401 Display your products *in the plant*—where both visitors and employees can see them. Both will notice an attractive display, and the shop men will be proud of it.

402 Train your own tool engineers. Depending on piracy is expecting someone else to wind your watch.

FROM A DIEMAKER'S NOTEBOOK...

The diemaker, as well as the tool designer, is responsible for a good many of the troubles met in production. Here are some tips garnered from 15 years of experience in die shops

BY ROBERT G. PLANCK
Toolroom Foreman,
REGAL TOOL & MFG. CO., INC.

CHOOSING A DIE SET

Essential points to consider when using a ready-made pillar dieset or when constructing a dieset are:

First, determine the maximum engagement of pillar and bushing members. This will eliminate many misalignment troubles. The "shearing" or dulling of cutting edges on one or both sides of a die opening or cutting edge may be the direct result of cocking, or careless assembly of upper and lower members.

Caution: Pillar length is determined by the shut-height dimension of the completed die. Some allowance should be made for sharpening or reworking. Therefore, I suggest that posts should be approximately 1/4 in. shorter than this shut height. (Shut height may be defined as the dimension from the bottom of the lower shoe to the top of the upper holder when the cutting members are engaged to their working depth.)

Second, what size of the opening that may be encountered in the bolster plate of the press? In many shops the same bolster is used for heavy forming and blanking as well as piercing dies. This is not a favorable condition, but can be offset somewhat by using an all-steel die set or a set heavy enough in thickness to eliminate the possibility of major damage.

If slug openings are spread about a piercing die, or difficulty is encountered in eliminating large blanks or slugs, it may be wise to reinforce the die shoe with a secondary bolster plate screwed to the bottom of the shoe. Openings and channels may be machined into this secondary bolster to permit slugs or blanks to pass out of the die shoe and, by gravity, slide over the top of the press bolster and out the back of the press (using an inclinable press). Proper design of this secondary bolster will eliminate need for a heavy press with a large bed opening, and also the practice of using parallels under a dieset to obtain clearance for slugs.

CHECKING A DIE SET

Always check a newly constructed dieset for parallelism of mounting surfaces. These are the upper surface of the punch member and the lower surface of the die member. Check also the fit of the individual guide posts in their bushings. Slight enlargement of the guide bushing, by lapping, may be required. For most diesets using standard pillars and bushings, the clearance between guide posts and bushings is best gaged by a "dry trial." Without lubricant, the post should be free in the bushing. It is best, in most cases, to remove the pillar, or use a standard spare for fitting.

After checking and correcting the fit of pillars and bushings, always apply lubricant—heavy machine oil, grease, or petroleum jelly—before assembly. If this is not done, severe binding may result. Close attention to these comparatively minor details will lessen the possibility of scored guide posts and badly sheared or broken punches, especially when a die is to be used in a high-speed press; (over 150 strokes per minute).

DIE LAYOUT

In many large shops, extensive layout of dies has been eliminated by the use of the jig borer. Important holes and surfaces are located by means of the vernier or micrometer gages on the machine. In smaller shops without these facilities it is necessary to continue with the old method of layout. On large or complicated work, the use of commercial layout inks or of a "copper sulfate" solution is not always satisfactory. An effective substitute method is to heat the die member in a furnace or over a torch to obtain a straw or blue color (approximately 500 to 600 F). The colored surface is not likely to suffer damage easily, and low heat has little effect on ordinary annealed tool steels.

DIE CLEARANCE

Clearance is usually specified on tool drawings thus: "0.003 in. all around," meaning 0.003 in. on each side, or, on round dies, 0.006 in. on the diameter. Generally speaking, good practice on piercing and blanking, or any type of cutting or clipping die, is to provide clearance of 5% of the thickness of stock on each cutting edge. The experienced shop man, of course, will keep in mind that holes in a part retain the punch size and blank sizes are determined by the size of the die opening.

Taper clearance in dies may not always be specified. In compound dies the opening is straight, but in ordinary follow or blanking dies, when the blank and slugs pass through the die, taper clearance is required. A good rule is: 1/2° included angle

DIE CLEARANCE...continued

clearance, or 1/4° on each side. Although this may seem to be a very shallow angle it is sufficient for the purpose and has the additional advantage of prolonging die-life, due to the greater number of grinds possible before size limits are reached and heavy burrs result. The accompanying table will help in checking this clearance.

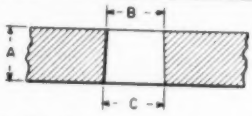
In opening up slug-clearance holes through die shoes, my experience demonstrates that it is best to taper ream all holes from the bottom of the shoe. These tapered holes should be slightly larger at the top of the shoe than the hole in the bottom of the die. Application of this principle will eliminate slug jamming in clearance holes.

Often, one or more small blowholes will be encountered when drilling out slug clearance openings in cast-iron diesets. It is usually necessary to fill up these blowholes and re-machine the slug opening. Any commercial cast iron cement may be used. If the blowholes are too large or too numerous, it may be better to line the hole with a soft steel or cast-iron bushing.

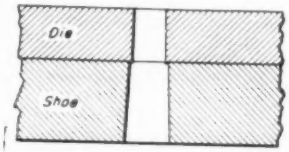
CLEARANCE - HOLE DIMENSIONS

For 1/2° Included Angle Clearance

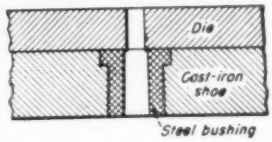
A	B	C
3/8	1.	1.0033
7/16	1.	1.0038
1/2	1.	1.0044
5/8	1.	1.0054
3/4	1.	1.0065
1	1.	1.0087
1 1/4	1.	1.0109
1 1/2	1.	1.0131



For a 1-in. hole in a die plate, values of C are selected according to plate thickness, in order to obtain slug clearance equivalent to 1/2° included angle



Slug holes in the die shoe should be slightly larger than the holes in the die plate



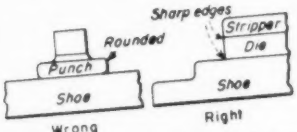
Use a bushing if the slug hole is drilled into unsound metal that might catch slugs

SHEARING THE PUNCH IN DIE

"Shearing", as used here, means the final sizing of a soft punch by fitting it into a hardened die opening. In practice, it is customary to bevel or chamfer the leading edge of the soft member in order to centralize the punch and obtain, as far as possible, a uniform shear all around.

If cutting edges of the hardened detail are broken slightly with a fine oil stone the tendency for the soft member to "tear" will be lessened. It will, in fact, have a burnishing effect on the soft member. Never attempt to shear more than a few thousandths of an inch, and always use white lead and oil as a lubricant.

MOUNTING PUNCH AND DIE DETAILS



Rounded mounting surfaces look amateurish and serve no purpose

Do not round the corners on the outside edges of the mounting surfaces. A nice blending will be noted if bottoming and matched edges are left fairly sharp. The observance of this practice will add materially to the workmanlike appearance of an assembly.

DOWEL PINS

The following procedure may be used as an alternate method of fitting dowels when the suitable reamers are not available.

1. Lap the holes in the hardened punch and die for a light drive fit. Use white lead when trying dowels.
2. Mount hardened details on the shoe with the regular screws and align.
3. Transfer dowel holes 1/32 in. undersize.
4. Invert shoe and enlarge back of holes 1/32 in. oversize, leaving only enough length for the fit of the dowel.
5. Re-align the hardened details and enlarge the holes to within 0.003 to 0.008 in. of finished size.
6. Sharpen one end of the dowels by grinding them square on the surface grinder. Break the extreme sharpness on the edges of dowels with an oil stone and carefully drive them through the hardened details. Tap each pin lightly until started, then drive carefully, alternating until pins have sheared the holes all the way through. Use white lead as a lubricant. Do not drive dowels too fast, otherwise the holes may be scored and the dowels will pick-up.
7. After driving the dowels through, clean chips out of the holes and re-chamfer the dowels. The holes will then be a medium light drive fit for the dowels.

DOWEL PINS... continued

STRIPPER PLATES

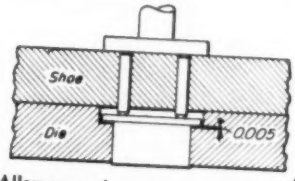
Never round the corners or edges of punch openings on the side of the stripper that comes in contact with the stock. You can break the sharp edges but do not round or bevel. Stripping action, in most cases, is a very severe operation, particularly when cutting edges have become dull. As dullness increases, stripping pressures also increase, because the stock tends to cling to the punches

STRIPPER PLATES...continued

more tightly. Excessive chamfering or rounding on the under side of the stripper opening only makes stripping action more difficult.

Stripper opening should, in most cases, be no more than a few thousandths larger than the punch. For very thin stock (under 0.015 in. thick), the opening should have only about 0.001 in. clearance all around.

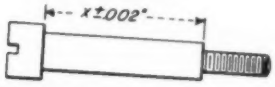
COMPOUND DIES



Allow some clearance in the maximum ejection position for a shedder to avoid excessive pressure on fragile details

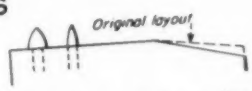
In final assembly of any compound die, try to eliminate spring and knockout pressure on any of the fragile details such as shedder shoulders or cam movements.

In mounting the stripper (usually on the bottom or punch member) check and correct the shoulder-to-shoulder dimension of all stripper bolts. This is necessary to insure proper functioning of the stripper.

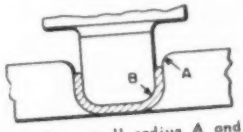


Make certain that shoulder-to-shoulder dimensions of stripper bolts are alike, so that the stripper functions properly

FORMING AND DRAWING DIES



Leave enough stock on forming punches so that over-forming does not occur in the first trial



Start with a small radius A and increase it until the correct bending or drawing action is required. The same applies to radius B which determines the final shape

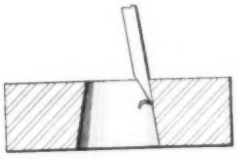
In the original layout of any forming or drawing die, remember that it may have to be reworked to enable parts to conform to gages. Therefore, allow safety margins where possible. An accompanying illustration shows by dotted lines how a forming punch was originally made, and then the final result, obtained by reworking the punch to obtain sufficient forming action.

Forming action should not be excessive. Bending or drawing action is largely determined by the radius at die opening and the final shape of the part is determined by the radius on the punch. It is usually desirable to use small radii to start with and increase them only as much as the forming action requires. An excessively large radius will only prolong forming or drawing action, and will also add materially to the height or depth of motion required, thus increasing die thickness and punch length.

HARDNESS OF PUNCH AND DIE DETAILS

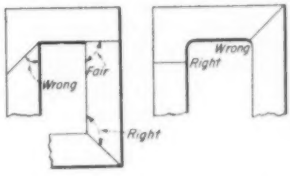
	Rockwell C
Die Members	60 - 63
Punch Members	57 - 60
Stripper Bushings	60 - 63
Pilots, "Blue Heads"	57 - 60
Piercing Punches, "Blue Heads"	57 - 60
Punch Sleeves, "Blue Heads"	59 - 62
Pilot Back-up Rods	54 - 57

Note: "Blue heads" refers to "drawing back" or softening of heads and shanks of small- or medium-size punches to eliminate brittleness. This is done by re-heating these heads and shanks to a temperature range somewhat higher than the ordinary drawing temtemperatures used in heat treating. On oil- or water-hardening tool steels, a blue color will indicate a temperature of about 600° F, resulting in a hardness of R_c 40 to 50.



CHIP a blanking contour from the top of the die plate, instead of from the bottom, in order to avoid breaking out metal beyond the scribed line. This precaution should be observed when knocking out the central core after drilling holes inside the blanking outline, also when chiseling away the "bridges" left between the holes.

CORNER MEMBERS of sectional dies should never be made with an included angle that is acute. Such construction is weak and leads to chipping. If the corner is radiused, the separation should occur outside of the arc to avoid having to machine two radii and the problem of blending them.



DIEMAKER'S KINKS

By FEDERICO STRASSER

Whose Idea?

How many ideas must be born to blush unseen?
How long must the young executive waste his brilliance on the desert air?

BY AUSTIN M. ELLIOTT

IT HAS been said that, in submitting a new idea, regardless of how good it may be, the proposer should be prepared for three rebuffs: (1) the inability to attract the attention of busy people, (2) the natural resistance to change, and (3) the possibility of the proposed change affecting someone's job. It is further said by the high-minded moralists that, far from being affected or discouraged by these obstacles, the proposer should be prepared for them.

Yet, ideas, new ideas, represent about the only modern counterpart of unexplored frontiers left to the young people of today. Must they continue to face these disappointments merely for the sake of having something to conquer, and in the misguided belief that only in the presence of the catalyst of adversity can true success be realized? To believe this is to give the stamp of "poor quality" to anything that is produced more easily as a result of the idea. It is akin to telling an expectant mother that childbirth without fear or pain is unsatisfactory, sinful, and bad for the child.

How long would a plant suggestion system survive under such a handicap? You wouldn't think of applying that brake to ideas worth $25 or more. Then why condone a practice that is damming a source that may be worth thousands of dollars, and which is offered free? For young executives are barred from the rewards offered by suggestion plans on the basis that they are essentially "idea men."

What procedure, then, must be followed by the young aspirant who is coming up with ideas and who is going strictly by the book in having his facts in order, in knowing the estimated cash savings to be realized, and in being prepared with carefully thought-out answers to all the probable questions the senior executive may pose? What can he do or say when the Big Boss says he has no time now to discuss it, and then, lolling comfortably in his padded chair, proceeds to spend a large chunk of the time he doesn't have in discussing any trivia that come to mind—just as long as it isn't the subject first proposed?

Ringing the Changes

Interesting modifications are sometimes achieved by generalities that skirt the idea, now and again dipping into it, but never long enough to give the proponent time to more than open his mouth—after the manner of a landed fish. Endings can be fascinating, too. The most popular one seems to be the one where the Big Wheel suddenly rises, in the middle of a sentence, and darts from the room without saying, re the idea, "Good," "Lousy," or "Shall we dance?"

Should our idea man still be around a few months later—after all, this may be a one-plant town, or maybe he owns his own home and has a couple of kids in school—he can be sure of seeing the sequel. Out of a clear blue sky, the Boss will suddenly announce, not to, but in the presence of, our idea man, "As I see it . . ." and then proceed to give chapter and verse of the rejected idea, but with no mention to or of its originator.

Only Human

We read a good deal about "Keep the ideas coming," and many articles make much of the statement that "It doesn't matter whose idea it is." Oh, doesn't it? It seems that somewhere along the line these pundits are overlooking one all-important fact—the human being, and his peculiar habit of acting and reacting like a human being. Angel, devil, saint, drunkard, genius or screwball—no recognition, no praise and approbation, and sooner or later, no production. If the captain of the team is going to play in all positions himself, take all the bows, reach to backbreaking limits to snare the ball every time, he need scarcely be surprised to find the rest of his team in the showers, or just standing around.

A particularly vicious scene stealer is mail handling. This consists of taking any letter addressed specifically to subordinates, concerning some shop job, and routing it to the president, sales manager, or chief engineer. Having one of them out of town so the mail gathers dust on his desk, helps put

whiskers on the young'un's idea, and grey hair on his head. A touch of variety and real verve is added by routing it to the general superintendent who provides a neat touch by rushing into the shop and nailing the first foreman he can find. Waving the letter in the air, he announces: "This is just what we need. Why doesn't anybody but me think of these things? Starting with that skid load over there, all these parts are to be handled this way."

What price Getting Your Idea Across? Too often and too true is it that, if it's good, the fellow responsible never hears about it—but if it's bad, everybody hears about it, and forever afterward.

If ideas are wanted from the young men in your shop, don't just say it—mean it! Give credit where credit is due. Don't smother the most tangible proof of an employee's interest in his job—feed it!

Cultivation Needed

Ideas spring most readily from an enthusiastic, conscientious and ambitious mind. Like any growing thing, this crop requires a certain amount of constructive attention. Treatment reminiscent of the searing blasts of a flame-thrower used indiscriminately as a weed-killer, or plain old-fashioned neglect, will produce no harvest at all. Similarly, as in separating the grain from the chaff, a considerable volume of ideas at the beginning may sift down to a very small quantity of usable material. However, some showing is better than none. Quality and quantity are still a matter which rests largely in the hands of the cultivator.

Executives of every company, and at all levels, know they must have a continuous crop of good ideas coming up at all times—yet they do little or nothing to promote a successful harvest. Either they feel the only good ideas are the ones they germinate themselves, or they think the young idea-man represents the seed to be cast upon the fertile soil of their organization—nothing more is needed. 'Tain't so! No farmer ever obtained a bountiful crop by merely scattering the seed and saying, "Now grow, dammit, grow!"

VPI to Protect In Transit

A CHEMICALLY TREATED paper, developed by Shell Chemicals for packing metal parts and products during shipment, slowly releases a vaporizing material that forms a film on the metal parts to inhibit rust. The idea is a considerable improvement over the older method of packing unfinished metal parts in oiled or waxed paper, then adding a dehydrating agent to the package. Paper breaks and leaks; dehydrants get used up over a period of time; and the metal parts can still get rusted with conventional packing.

The letters V P I stand for Vapour (British spelling) Phase Inhibitor. Chemical action is not one that can be stopped or worn out if the package does break slightly. The gaseous chemical, released by the paper during shipment, forms a film on the metal parts. The chemical does not dehydrate or resist moisture—only inhibits rusting action. In fact, if the parts are moist, the chemical will dissolve in the water film and will inhibit rusting with a continuous action anyhow.

Packaging is only slightly more expensive than with non-treated paper. As long as paper is no farther than a foot from a surface that is to be protected, the protection should be expected to last as long as 5 years.

Austin Motor Company (of England) has adopted the packing material for world-wide shipments of automotive parts and assemblies, expecting to save time and expense by avoiding the application of greases, oils, and other protective materials. A significant saving is the reduced cost of removing the wrappings at the destination, where parts can be assembled directly without requiring special cleaning.

LOW-COST JIGS FOR THE SMALL SHOP

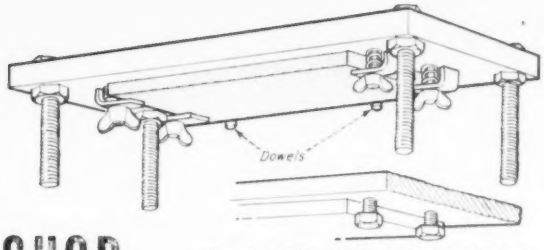


Fig. 1.—Table jig for simple rectangular part. Work may be held by finger pressure or small, inexpensive clamps

When toolmakers are not available, and extreme accuracy is not required, simple jigs are easily made, at minimum expense, by following the procedures outlined here

BY FRANK BIECHELE, Shop Superintendent, SERGE ELEVATOR CO., INC.

ACCURATE, efficient drill jigs can be made from scrap stock, capscrews, nuts and bolts, and a little layout knowhow. The first step in layout is to establish a centerline or base lines at right angles to each other, from which all subsequent locations will be calculated. The nature of the job determines which is preferable. On rectangular work, it is customary to use two adjoining edges as base lines. On work of irregular shape, a centerline is usually established, according to locations indicated on the blueprint of the part. Or, in some cases, several centerpoints may be marked, with dimensions radiating from them. Occasionally, layouts demand use of all three procedures.

There are several primary methods of establishing base lines. On flat work, for example, the drill plate is clamped in a vertical position to an angle plate or square block, with one edge resting on a flat table or surface plate. If a surface gage or vernier height gage is not available, layout lines can be made by piling up blocks of scrap material, preferably cold-rolled steel, to the required height, using the top blocks as a straightedge when scribing the line. Other parallel line locations can be scribed by adding more blocks of the right size. Paper or metal shims can be inserted between blocks to compensate for stock variation or nonstandard dimensions. The plate can then be turned at right angles to rest on an adjacent edge and the same procedure followed to scribe cross-line locations.

Where the block system is impractical, base lines can be scribed by establishing one base line, reasonably parallel to the edge of the work, and using a square for the second base line, or by laying out a perpendicular line geometrically. These, and all subsequent lines, should be deeply scribed. Dimensions based on these lines should be laid out with rigid dividers, using a deeply engraved steel scale, so the divider points can be set into the scale lines and the thumbscrew tightened to hold them in exact position. Light, adjustable dividers are not recommended, because a little pressure will cause them to spring, and results in inaccurate transfer.

Round Jigs

On round plates, you will usually find it necessary to establish a centerpoint as a basis for further dimensions. Scribe two intersecting lines with a scale and center head to establish the center, then use a rigid divider and scale for the rest of the layout. Or chuck the plate in a lathe, center drill, and scribe whatever concentric lines may be required with a pointed tool held in the toolpost, using the cross-slide dial for correct locations. Do not attempt to lay out angular dimensions, even if shown on the blueprint. Instead, calculate the horizontal and vertical distances from the centerlines by simple trigonometry, and lay out to straight line dimensions.

Irregular parts may require all of these general layout principles. Usually, the blueprint or engineering sketch will determine how locations are to be established. If a finished workpiece is available, it is sometimes feasible to use this as a templet by positioning it against locating pins and drilling through it and the plate.

Do not use progressive dimensioning in layout. That is, a series of holes in line should not be laid out from one point to the next point. Any slight error on the dividers will accumulate with each additional measurement until the over-all error becomes great. It is preferable to lay out each hole individually from the base lines to keep errors to a minimum.

After hole locations are established, use a center drill, or a short, small drill to pick up the centerpunch marks and pilot the finishing drill. This will limit deviation from center locations and produce an accurate job.

The importance of sharp, deeply scribed lines is again stressed, because the intersection of such lines can be felt with the point of the centerpunch. This is much more positive than visual location. It is also important to hold the centerpunch vertical, as a slight angle will raise an unequal burr and cause the pilot or center drill to drift out of location.

If a milling machine is available, an extremely accurate layout can

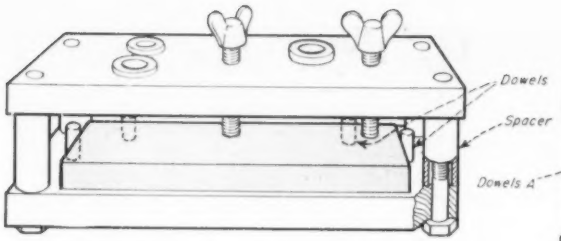


Fig. 2.—Sandwich jig is more suitable for larger work and larger holes. Dowels are used for end and edge location, and thumbscrews for clamping the work in the jig

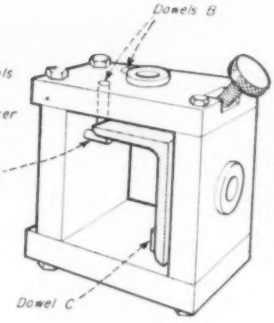


Fig. 3—Box jig designed for drilling both legs of an angle-iron workpiece. End locators can be positioned to suit, but should be at left-hand end to prevent movement when clamp screw is tightened

be made by clamping the plate on the table and using the dials to establish hole locations. With a center drill chucked in the spindle, each hole is center spotted as the desired location is reached.

Types of Jigs

Primarily, drill jigs fall into three classifications: table jig, sandwich jig, and box jig. The table jig, shown in Fig. 1, is simply a drill plate with bushings, four legs, and locating points. The legs are ordinary capscrews, with locknuts to secure them to the drill plate. If greater accuracy is required, a dowel should be used as an end-locating point in place of the capscrews, although these will still be required to support the work. The ends of the legs should be machined off after assembly so the jig stands level.

Bushings are optional, depending on production quantity. Bolts, with the heads cut off, can substitute for dowels as locators, and may be filed to suit close location tolerances. Layout on such a jig is simple, because all locations are on one plate, with two edges serving as base lines.

The sandwich jig, shown in Fig. 2, is sturdier for long-run jobs and more accurate work. In this type again, the complete layout is made on the drill plate, after which, both plates are securely clamped together and all holes drilled. The clamps are then removed and the top plate reamed for bushings and tapped for thumbscrews and capscrews (legs). The bottom plate is reamed for dowels (locating points), and for a body fit on the capscrew legs. The bushing holes in the lower plate should be opened up so the burr on the work will not interfere with unloading.

Assembling Bushings

If bushings are used, they should be pressed in before the jig is assembled, as pressure on the assembled jig might cause misalignment of the components. The heads of the capscrews serve as legs, and should be faced off after assembly.

There will be extra holes left in both top and bottom plates, but these will not affect the jig in any way. Indeed, those in the top plate will serve to allow more coolant to flow down onto the work.

A good example of an effective jig for drilling angle iron on both legs is shown in Fig. 3. This is often a problem in both large and small shops. The jig is quick acting, with plenty of chip clearance, and is easy to keep clean. Layout, if taken step by step, is comparatively simple. It is a simple box jig, of four plates held together with bolts or capscrews.

The angle-iron workpiece rests on dowels A and on the bottom plate of the jig, and is held against dowel B and C. This affords a three-point setting in both directions and eliminates possible rocking. Angular pressure of the thumbscrew makes location positive against all points. The capscrews which hold the jig together serve as legs on one side, and the extended top and bottom plates for the other side. The ends of the plates and screws should be faced off after assembly to make sure they are exactly even.

After the four sides have been cut off to length, the top plate is laid out for bushings and dowels B to insure proper relation between the hole and the locating points. The four plates are then assembled to form a box, using capscrews and dowels where convenient. The centerline location for dowels A and C can be scribed by using the block system.

There are three alternatives to using standard bushings:

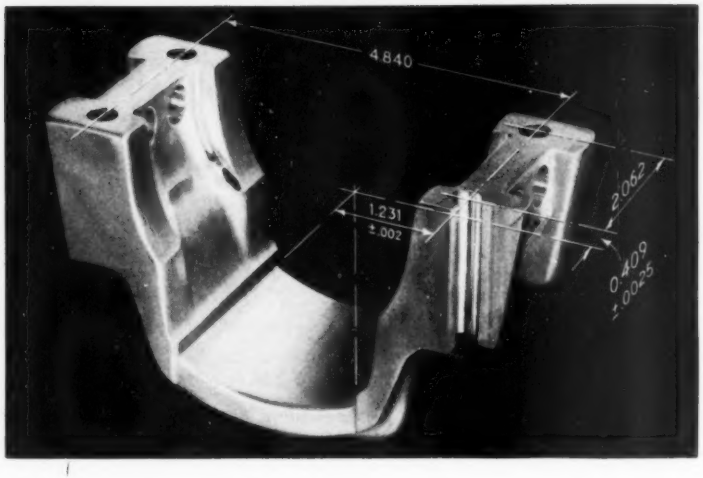
1. The drill holes are made to size and used to pilot the drill until they wear too large to maintain the required tolerances.

2. The plate can be case hardened, locally, at the holes, with Kasenite or similar commercial case-hardening compound, to provide a longer wearing surface.

3. A piece of tool steel can be used for the drill plate, and hardened and tempered after machining.

Use of bushings, however, is recommended when production is reasonably high. There are many types of commercial bushings available at low cost, but for odd sizes or non-standard diameters, bushings can be turned from drill rod and hardened by heating to cherry red and quenching in water. The bushing is then polished, and tempered by reheating slowly to a medium straw color and quenching quickly in water at room temperature. The whole process takes about 10 min.

Cold-drawn steel can also be used for bushings, by case hardening as explained earlier. Occasionally, it will be found that a completed jig has one hole out of location, because of an error in layout or drilling. This can be rectified by making an eccentric bushing to correct the error, rather than by laying out and making a whole new jig plate.



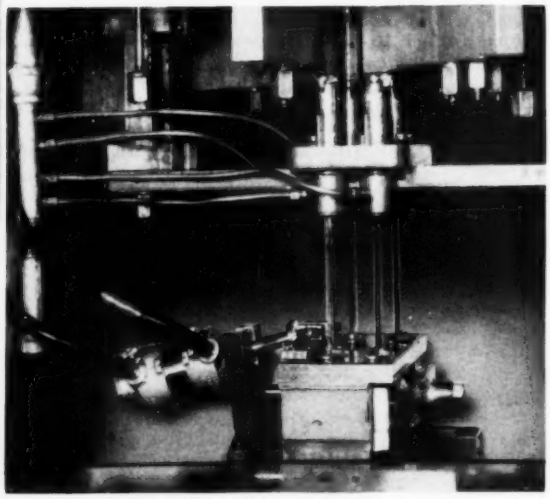
Bracket cap for aircraft-engine mount is 17ST aluminum alloy. Holes are not particularly long, but accuracy and finish requirements are high. Four holes, located as shown, must be within 0.001 in. of true position and square with bottom within 0.002-in. full indicator reading. Eight pieces per shift were produced with twist drill followed by reamer, and 50% of these were scrap. Changing to gun drill increased output to 120 pieces per shift; no scrap. Cutout front right corner shows quality of drill finish

ACCURATE HOLES NEEDN'T BE DIFFICULT

Design engineers say, "Stay away from deep holes with tight tolerances. The shop can't hold size."

We thought so too when conventional drilling and reaming produced 50% rejects

... Then we tried gun drills; have had only two rejects and increased production 1400%



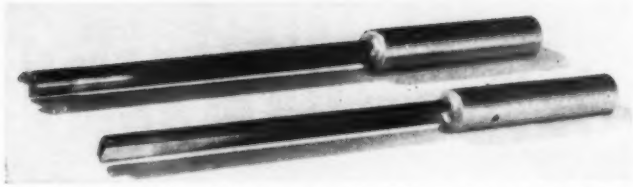
Drills never leave the bushings in this unusual gun-drill setup. Part is air-clamped in precision fixture and entire work area is enclosed as lubricant exhausts at high pressure. Drills are rotated at 2000 rpm by multiple drillhead. Table feeds upward at 2½ ipm

BY FRANK GIANNOTTI, Plant Supt.
The MB Manufacturing Co., New Haven, Conn.

AIRCRAFT engine-mount brackets are designed to very close tolerances to minimize fatigue and other stresses. The MB Manufacturing Company specializes in vibration dampening devices and particularly in vibration dampening aircraft-engine mounts.

When a prominent engine manufacturer placed an order for a large quantity of these brackets, to be delivered in hundreds per week, an unexpected bottleneck developed. The bracket cap, a 17ST aluminum-alloy forging, required 4 holes 0.3755-0.3770 in. dia, spaced within 0.001 in. of true position, square with the bottom within 0.002-in. full indicator reading, and 1.750 in. long. The job didn't appear difficult.

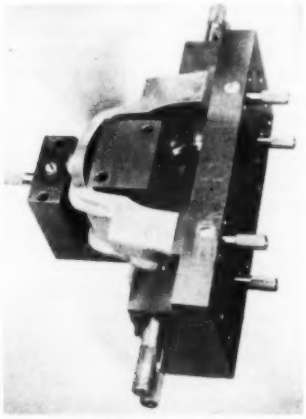
Operation sheets were prepared which called for drilling and reaming the holes with precision drill jig with hardened steel bushings, conventional twist drill, spiral-fluted reamer, and a standard drillpress. Holes were drilled and reamed individually. Production was 8 pc per shift on one machine, with rejects as high as 50%. Despite



Gun drills, with solid carbide tips, are used to finish the holes to size in one operation. Drills are 0.3763, ±0.0000, –0.0002 in. dia; hold size within 0.0003 in.; straightness within 0.0001 in. of true position. Lubricant enters drill at hole in shank and leaves at single-lip cutting edge. Chips are carried back through the V-groove and out of the hole

tool and setup changes, including a variety of drill grinds, speeds, feeds, and lubricants, there was very little improvement. The principal cause for rejection was tapered holes, and this was closely followed by scored hole walls. When reaming was tried to correct the taper, the reamer followed the original hole. In addition to tapering and scoring, it was difficult to hold the size within the necessary tolerances.

The suggestion was made that Fred Bloch of Eldorado Tool Company, Milford, Conn., might be able to solve the problem with a gun drill. *A gun drill!* At first this sounded like more trouble. After all, hole depth is less than five times its diameter, it isn't a "deep" hole. But we called Fred, anyhow.



Inspection fixture is used to check hole location and size on each piece immediately after drilled part reaches room temperature. Flush-pin gages show variations in position, and alignment pins, all of which must enter smoothly but snugly, show inter-hole relationship, plus accuracy of position and size

The job was set up on a standard drillpress with a fixed head and a hydraulically powered table feed. The original fixture was used with some minor changes, including new bushings, and air-operated clamping. Four carbide-tipped gun drills were made to a diameter of 0.3763 in., plus nothing, minus 0.0002 in. and installed in a multiple drillhead. The drillpress work area was completely enclosed, with a Plexiglas sliding panel at the front for loading and visibility.

Gun Drills Rotate

All four holes are drilled at one time, with the *drill turning* (not the work, as is usual in gun drilling). Lubricant is a 110-Saybolt-viscosity sulfurized cutting oil supplied at 350 psi pressure. From the beginning the job went smoothly. Only minor changes in feed, speed, and pressure were necessary. Now, instead of 8 pc per shift, we average 120 pc and they are all usable. No reaming is necessary as the 0.3755-0.3770 dimensional allowance is constantly held within 0.0003 in. of the mean; straightness is within 0.0001 in. Surface finish in the hole is 8-10 rms. The hole is finished to all the necessary tolerances with one tool in one setup and with one operation. To date, 3000 pc have been completed without resharpening the drills. Only 2 pc have been scrapped; this, as a result of two drills breaking. One drill snapped when the part was placed in the fixture askew and the other one broke when the lubricant pressure failed. Chip load is limited by machine speed, not by the drill. Actually, both speed and feed could be doubled or tripled without damage to either part or drill.

In addition, to the increased production and the reduced rejects, changing to this method has eliminated out reamer costs.

Gun drills no longer scare us. Despite the fact that they require more equipment initially, we now have fixtures being readied to do all of the holes in the part by this method. Some of these holes are only 1 to 1, depth equals diameter, but the faster rate and better quality make the method worthwhile. Gun drills are worth considering, not only when the hole length is five times its diameter, but whenever, on an accurate production operation, a twist drill must be backed out for chip relief before the hole is completed.

Carbide-Tool Holders

BRAZED CARBIDE toolholder assemblies have given way gradually to the ejector holder—which grips the carbide cutting tool firmly, allowing no tool damage because of defective or broken brazed joints. Features of ejector holders were discussed at a recent meeting of the Worcester, Mass., chapter of the Society of Carbide Engineers.

Horizontal holders are designed to take square, solid inserts ground on three sides. Resharpening operations remove only a third as much carbide as with a brazed assembly and no steel at all; therefore a diamond wheel can be used exclusively.

They have shock-resistant properties that can cut tool breakage (over brazed tools) from 40% to as little as 1% on some jobs.

Vertical holders are quick to set up and make regrinding easy, although they lack flexibility. Round, square, rectangular, or triangular inserts can be held, but the tool must fit the job.

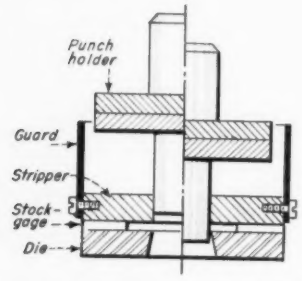
The square insert can do good finishing, has four edges per end.

For varied jobs, the triangular insert is most versatile. It can cut square shoulders, is the best finisher, and is most used.

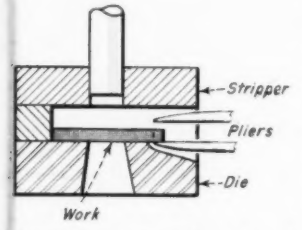
Rectangular inserts offer only two edges per end, but do plunge-cutting, lead angles, and shoulders.

DESIGN YOUR DIES FOR SAFETY

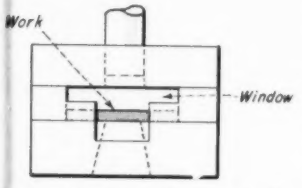
. . . and at the same time, you can get higher production



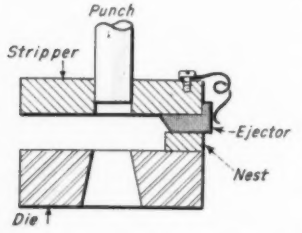
Guarded, stationary stripper keeps fingers out of danger zones



Adequate nest and opening cut in die plate give room to load and unload second-operation die



Small window permits use of pliers safely in "2-story" nest



Ejector strips work from punch and flips it out of die

BY FEDERICO STRASSER

THERE is more to press-room safety than application of suitable guards on presses, education of employees and vigilance about observance of safety rules. Safety can and should originate in the design of the tools.

I say this because no serious accident has occurred in shops where I have been press-room superintendent and later in my own shop. Presumably this is true because certain principles in European die design have been followed.

Before going into them, I would like to enlarge upon why press-room accidents are more prone to occur when the die designer has failed to build safety into the tools themselves.

Education. No matter how well management or its safety engineers instruct press operators, accidents can and do happen. Physical or mental fatigue may cause momentary inattention. And there is always an individual who eventually thinks he can take a chance or seemingly forgets all of his safety instruction at a critical time. It is up to the designer to forestall expensive accidents.

Press Guards. These devices are made in many forms, but they all have a common purpose: To prevent physical injury to operators, chiefly the hands. On the contrary, they do have one detriment: often they slow down the production rate. On piecework the temptation is strong to make guards inoperative or to discard safety pliers, vacuum lifters, picks, etc., when the foreman is not watching. By depending on guards alone, the die designer has not completed his job.

Automatic Feeds. To speed production and increase safety, the plant may apply feeds of various sorts. They are expensive. They avoid the necessity of putting hands in the danger zone (under most circumstances), but they do not eliminate the possibility of doing so.

Many years ago, Oberlin Smith said: "The only remedy is to design dies with automatic and other safeguards to make it impossible for any part of the operator's person to enter between them."

An inexpensive method that is foolproof and doesn't slow down production consists of designing dies with inherent safety features and applying a small, stationary supplemental guard. By methods that had been used successfully for over 20 years, an increase in hourly production of second-operation dies results, as compared to unprotected dies.

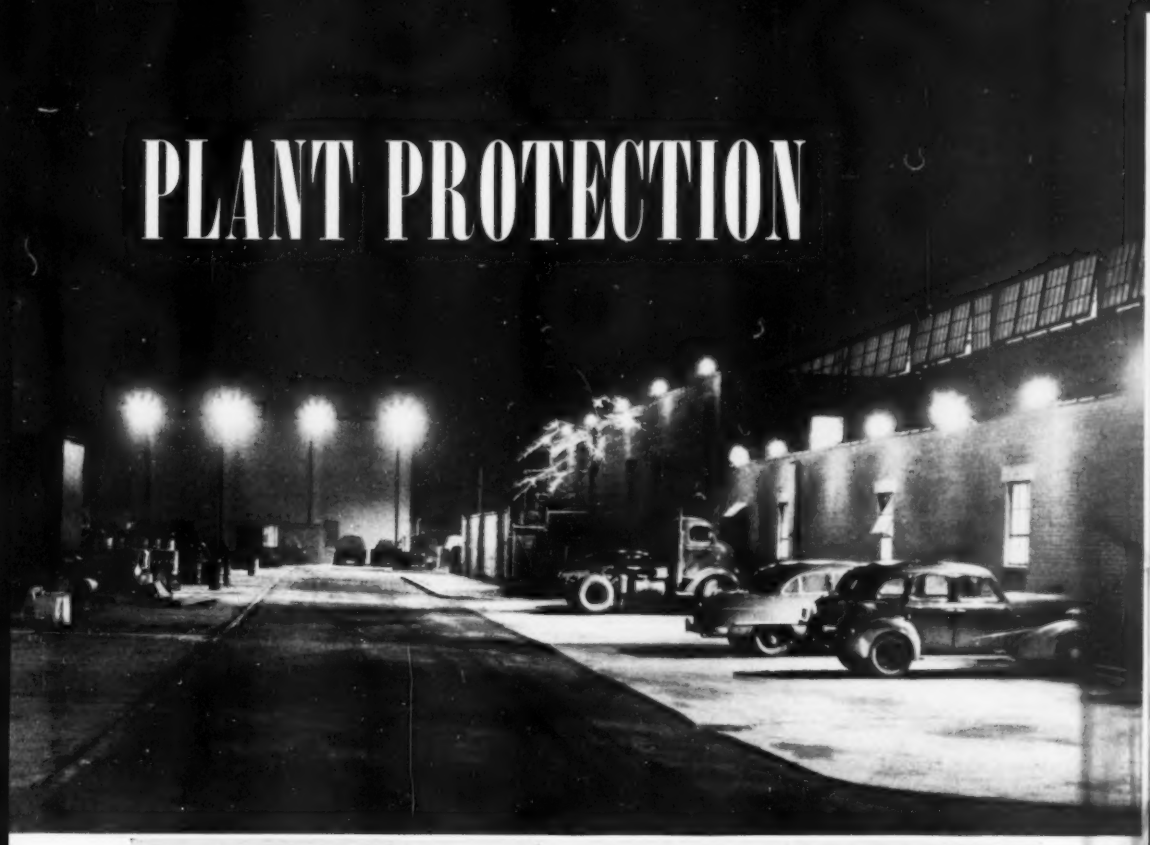
In all of my dies the stripper is stationary. This prevents putting a finger between the stripper and die proper. The stripper plate is thicker than usual and the punches do not leave their guide bushings. And a sheet-metal guard is placed so a finger cannot be placed between the punch holder and stripper. Construction of this kind costs a little more but it does not interfere with application of an automatic feed.

For secondary piercing or punching operations, the die is similar to that for blanking, except in respect to work location and ejection. In these dies the nest is made "two stories" high. The first story is a nest that almost surrounds the work, leaving a small window where a small plier can be introduced if necessary for loading and unloading. The second story has a larger window for easier introduction and removal of blanks and is used whenever possible.

Since unloading is the time-consuming phase of working second-operation tools, it is desirable to introduce an automatic ejector. In some cases, the output can be doubled with such a device.

The closed-die type of construction can be applied to bending, forming, redrawing and other tools. Feeding can be manual or a slide feed applied for semi-automatic operation. And with automatic ejection, the chances of injury are reduced to an extremely low level.

PLANT PROTECTION



BY CHARLES EMERSON, ASSISTANT EDITOR

INDUSTRIAL SECURITY is a will-o-the-wisp. The only time you can be sure whether you have it or not is after your security has been violated—and then you know it wasn't good. But you can't wait to see how your security stacks up; you have to know now, and you have to improve it if it's not good enough. The job is a most difficult one, for as every good law-enforcement officer knows, as soon as you button up a building or yard so nobody can get in (unless he is authorized), someone usually comes up with a new way to get at your equipment. And what to do about your own employees who may do your plant harm? The following Special Report is no cure-all; but it may give some good answers to some of the difficult problems in protecting your metalworking property.

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Why Security?

SOME industrialists look at it this way: If you're not working on a prime contract or subcontract for a government agency, nobody's going to force you to knock yourself out in maintaining air-tight security. You *do* have to keep undesirable visitors and nosey snoopers out of the plant, just to limit confusion and interruptions. You *must* make sensible self-protective efforts, too, to bar thieves and vandals from your property.

But extensive screening, investigating, checking, and guarding may not be immediately worth all the effort in some cases. Especially in the small shop, where everyone knows everyone else, and the chance visitor sticks out like a sore thumb.

It's like wondering if you should lock the barn door—thereby complicating your daily passing through it—to keep your horse from being stolen. Providing, of course, that you're sure your horse is worth stealing at all, and providing there will be a horsethief in the neighborhood.

But, just as horses have been hamstrung for little apparent reason, so may your operations be blown sky-high through little effort of the saboteur—*if the need arises.* You have to decide whether or not you can afford to take the chance.

Plants working on government orders have little choice, and this includes most of the really big plants in the country, and many of the medium-size ones. If working on a prime contract, the plant is furnished with a security officer from the Army, Navy, or Air Force. Security standards have been worked out so one officer can take responsibility, even at plants where work is done for more than one service branch. If the plant is working on a procurement or confidential contract, the plant gets a security inspection before the contract is awarded—no security; no contract.

But here's another view: No matter what happens to the world situation—whether the present 'limited action' in Korea expands into a global blow-up or not—every plant takes some chance that it may be penetrated by enemy sabotage or espionage agents; and any person who deliberately damages production, equipment, or the capacity of a working force to keep producing can almost invariably be considered to be an enemy agent. Such cases have happened already; the idea is not at all a red herring.

The patriotic motive in protecting *all* plants from any likely damage is laudable, yet perhaps not completely convincing. Consider a plant that makes, among other non-essential products, a high-quality baby rattle. Supposing the plant should be damaged in a way that was obviously caused by enemy action. Now the production of baby rattles is not all-important in the realm of armament; but consider the effect of knowledge of this damage on other plants. Workers in the tank plant down the street will be affected psychologically—to the temporary (at least) extent of a production loss; management will be affected, too, to the extent that protection will be seen to be critical, causing a tremendous upheaval of worry, frantic action, and loss of administrative presence-of-mind (at least temporarily). So the damage in the baby-rattle plant wasn't a loss as far as the saboteur was concerned.

For a purely selfish motive, look to self-protection. How much chance can the average plant take on losing part of its capacity? The workers lose pay, the management loses profit and gets in bad with

Glare lighting along fence shows up intruder, placing him at disadvantage and protecting guards, who can move freely behind lights without detection. Lights behind fence are protected from outside

Floodlights on building parapet cover inside parking area, yard, and walkways, make guard inspections easier and faster. Floods on poles at right would be good addition to kill shadows under building wall and behind foliage

the customers; and the stockholders lose that next dividend. The answer—not much.

Assuming good self-protection on the part of the important, obvious targets for enemy action—and this may be unsound, because the plant that cannot be penetrated hasn't been built yet—what happens when the saboteur is excluded from a juicy objective? He picks an easier, less-profitable (from his point of view) one. Then the smaller plants, the out-of-the-way factories, the one-horse outfits are in for trouble. After all, they're producing war goods, too.

Complete protection, sealed invulnerability, may be impossible, yet the more difficult is the penetration of a plant, the less chance everyone takes on losing. The answer to the problem is to protect everything, from every angle, that you reasonably can within your ability right now; then make full plans immediately for an even stiffer protection program to be put into effect when an emergency may arise in the future.

What Is Security?

REAL industrial security is a tight rein on everyone and everything that can possibly damage your plant, working force, or production rate. But this is ideal—a goal that can be approached, but not quite attained. For any plant, large or small, the best course is to utilize those facilities that you have and can afford as efficiently as possible. Several main factors in plant security are:

Guards—for such simple, but alertness-demanding, jobs as inspecting lunch boxes, plant badges, visitors' passes at the gate, checking on in-an-out transport of all kinds, within and without the fences of the plant, and for patrolling the plant's interior and exterior to prevent penetration.

Lights—to discourage saboteurs; to allow the guards to spot and control them once near or inside the plant; to reduce as much as possible the differences between day and night operation of the plant.

Fences, walls—to keep the unwanted out; to keep them in so they can be caught, once they get in; to control vehicles.

Signal systems—to extend and multiply the effectiveness of guards; to substitute for guards sometimes; and to direct them in emergencies.

Communications—to make outside aid available; to transfer orders efficiently; to save time.

The security system—Of all, this is the most important, for it embraces all the other factors. Based directly on the plant and the conditions the method must fit, it is the key to effective security. Such points as size, location, production routine, physical

peculiarities, kind of employees, and probable weak spots of the plant, must be considered. As expensive a service as security cannot be wasted or used inefficiently. Although a pat answer for all cases—plants large or small, in crowded areas or barren, working on dangerous materials or harmless—would be convenient, such a plan would be ridiculously useless. Even if it were available, which it is not, it would tend to stymie a sensible approach to security, which is all-important.

The Security System

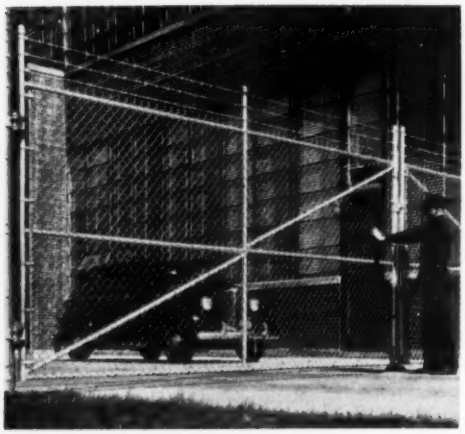
PROTECTIVE measures naturally vary all over the lot. One good way to start is with a well-trained and experienced security expert; the ranks of ex-FBI men, former law-enforcement officers, and safety engineers provide many for plants that are now well protected. Insurance companies, who are not anxious to allow their clients to lose property, can often provide technical advice. Federal-government literature, state-published booklets, and independent publications provide some aid to security officers who may lack training, but who may be able to use common sense, acquired knowledge, and expert advice to handle the plan for protection. In any case, the security officer should have complete charge of the protective forces and equipment in the plant, and should also be readily available to and should work closely with all security personnel.

Physically, a plant determines its own needs. A large one, regardless of the number of employees, must have a large force of security men. Such a plant has the advantage that it can afford many modern protective aids (two-way radio cars, independent communications lines, extensive search equipment, automatic signaling devices, and the like), and can therefore manage to be highly efficient with its security; which, after all, is an expensive item if it is to be worth anything at all.

Smaller plants may not be able to afford luxuries, but can use some extra equipment (burglar-alarm systems, protective agencies) that the others may or may not utilize. The smallest plants must stretch their budgets; only one guard is less than half as effective as two, for one man is in a more dangerous position in case of attack. In a small plant, the ratio of guards to working employees may be higher than in larger ones.

Some effective protective means are already present in most plants. Lighting, for example, is relatively cheap; yet is effective in discouraging and detecting penetration. Most plants could stand more light than they now have, and many will have to install extra fixtures. Although fencing is almost universal around valuable industrial property, a check by the security officer might often reveal that changes, additions, and repairing are necessary.

Guarding Techniques



Vehicle gate requires constant guarding, thorough inspection technique, and tough fences. Car and truck inspection demands guards with persistence, imagination, and finesse

NO MATTER how many protective devices a plant may have, the human element is vital. Guarding is the only real answer to danger from either outside or inside; although it can be aided greatly by other means. One advantage of live guards that is seldom exploited is their adaptability. Where you can set up a photo-electric circuit to detect any movement at one position—and only at that one position—the guard can cover many more positions simultaneously, and can shift from one set to another easily.

Starting at the simplest guarding job—that at the plant gate or gates—the number of men necessary is dependent upon the number of employees passing through the gates at any given time. For the peak hours when shifts are changing, an adequate staff for one gate might range from one to 10 men. A normal reaction is to pull a few men in from other jobs to handle the crowd; but this weakens the guard everywhere but at the gate, and creates an ideal situation for the enemy agent who wants to get in. He can perhaps pass a fence at the rear of

Guard post commands wide, clear view from reasonable height. Floods cover corner area, plus walls and ground in each direction. Light *at* guard post keeps guards in shadow, others in glare

the plant, then mingle with the changing shift to get to his objective. Regardless of how economical this moving of guards may seem, it is a dangerous practice. The best way to plan the guard setup is to establish a minimum guard force for the peak gate-passing hours, then build the remainder of the force on top of that.

At the gate, the guards check identification, look for contraband in lunch boxes and tool kits, and maintain order. The last is important. Any ganging up at the gate, rushing through it, tends to make inspections hasty; therefore increases the chances for anyone to slip through without identification.

As learned during the last war, counterfeiting identification is both possible and probable. A few things may tend to make it difficult: tamper-proof passes, photos, codes to indicate the time a given worker will normally appear for work. A good precaution is to make a complete set of new passes for everyone, but hold them secretly until an emergency seems imminent—then spring them on the whole working force. This would make all phonies made up to that time worthless. This can be done a number of times, and can be repeated at irregular intervals. In crowded industrial areas, the name or identification of the plant to which the pass gains access should not appear on the pass—a small point, but one that might slow up falsifying an identification. Guards should be drilled on pass checking, with a few not-too-obvious phonies thrown in to give them practice on spotting irregularities.

In smaller plants, personal OK's are much better than passes. If guards who can remember faces are available, they can be assigned to a given shift of men to pass them by recognition only—thus eliminating the complications of cards and badges. The guards' job can be made easier—therefore more effective—if a set of them change shift times with the shift of men they know.

But getting back to the adaptability of live guards; the work where this ability can be utilized is on patrolling the fences of the plant. Standard practice for most plants is a regular, scheduled round. While this is effective if tied in with a signal-station system, it is easy to nullify if it is carried out religiously on a real fence patrol. Tied in with lighting that keeps the guard in shadow and throws possible enemies into sharp focus, an *irregular* but *assigned* schedule keeps the saboteur or enemy agent guessing; therefore makes him much less effective. Start with a patrol route inside the gate walls, then make up some variations on the route, then make a number of different schedules for a complete round of the plant. This applies to a walking or riding patrol.

The security officer in charge, and the guard chief, should at all times know when and where their men are, but the fewer who do know, the better. By altering the schedules and routes from time to time, and by mixing up a set of schedules and routes from day to day, the security officer can effectively put his enemy at a distinct disadvantage. Where a guard walks back and forth regularly, or travels a timed route exactly the same way each hour, an enemy can quickly pick the time and place of least

SHOW YOUR BADGE
BADGE PASSES MUST BE SHOWN AND ALL PACKAGES LUNCH BOXES BRIEF CASES ETC MUST BE OPENED FOR INSPECTION BY THE GUARDS.

Pass gate must stop every one, pass only regular personnel and authorized visitors who are guided. Lunch-box inspections get cursory if guard drills and reminders are not kept up

danger to himself. But without any *sure* knowledge of where and when the guards are to be located near his objectives, he must take chances—or give up the idea.

As for the guards themselves; the best men are middle-aged or younger; although they should not be so young they are draftable. Elderly watchmen are common, but they are not too effective in *protecting*, although they can *watch* well enough. In the same plant, there may be reasons for both kinds of men. While the watchman can work inside the building, keeping tabs on lights, doors, continuous processes (if any), and the like—as a sort of secondary defense line; the guards can operate wholly outside the buildings, keeping people out, and maintaining a check on external equipment.

Armed guards are not universal, although if a decision to arm them is made, they should be well-armed and well-trained in the use of their arms. Once a plant is known to have armed guards, an enemy will come expecting trouble, shooting, and may expect to be caught or shot himself. Pistols are handy, while machine guns are expensive and sometimes (without excellent training) dangerous. Sawed-off shotguns, on the other hand, are easy to handle and use, and are unusually effective short-range weapons. Guards should also be equipped with small first-aid kits and signaling devices—perhaps Very (rocket) pistols, and certainly whistles.

In a two-way radio car, a pair of guards can cover a lot of ground, or can cover a given amount faster and more frequently; besides being able to answer calls rapidly and being able to carry more equipment. A pair of searchlights, spot and flood, are almost essential.

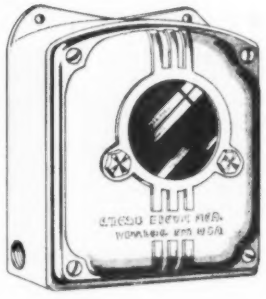
A central phone switchboard can be a good guarding device, too. A guard, detecting a prowler, can knock phones off their cradles as he follows the intruder, giving the central office instant directions.

A central security office, connected by phone and radio with local and state law-enforcement offices and with fire houses, can control a big, spread-out industrial area with maximum effectiveness. Often several plants of such character in the same area can combine security forces, establishing a single central office to contact all the radio cars and radio-equipped guard posts in the area. But the smaller, squeezed-together factories in heavily built-up locations are at a disadvantage. Often there is no room for vehicles, and without a car to carry the equipment, mobile radio is useless. It is often this kind of plant that can utilize the most modern detectors.

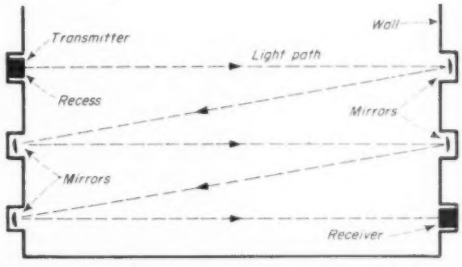
Warning Systems

PHYSICAL characteristics determine what the best warning device will be. One excellent electronic aid is the photo-electric tube. Primarily valuable in tight quarters, where an intruder must pass over ground that is well confined, the photo-electric circuit can detect the passing of a human instantly, and produce a signal at the main guard office. By crisscrossing a set of light-beam tubes and detector tubes, it can be made impossible for anyone to get into the plant or its yard without being caught. With up-to-date equipment, too, the intruder can't see the beam until he is in direct line with it, and by that time he has tripped the circuit. A photo-electric 'fence', set up across a pathway that must be followed to get into the plant, is more positive than guards. A beam is usually considered effective for lengths up to 500 ft outdoors, although heavy fog can cut this down considerably. For indoor installations, lighter equipment is rated for 150 ft. By using mirrors to double back the beam, a single doorway (for example) can be crossed by the light at five or six levels, any one of which, if interrupted, will set off an alarm. The use of mirrors, however, halves the effective length of the beam for each mirror surface installed.

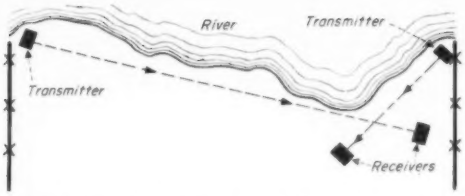
Another modern detector is the capacity switch, operated by the body capacity of any person coming within about 3 ft of the switch or 'fence' line. With this device, a pair of charged wires can be strung across a pathway. Even though an intruder might



Detection units like this photoelectric control may be equipped for inside or outside operation. Mirror reflection to double back beam is less effective outside than inside



Photoelectric setup for confined space between buildings or walls can be recessed into the walls, or may be mounted against the walls; it must not allow passage behind the equipment



Photoelectric setup for open area (shown in plan) may require overlapped beams to protect jagged boundary areas. Adjacent electronic units must be butted against one another, or may be crossed so corners are pass-proof

slip between them without touching them, his body capacity sets off the alarm.

Watchmen's alarm services, although operated in the plant by a guard or watchman, are electrical and mechanical devices with wide use. With the progressive-key type, a watchman must fit the key into each station box in exactly the right progression, following a fixed route through the plant. Tied in with a central station, the key-fitting produces a signal that is checked for time. Instant alarms are possible, as are secret signals to the central station to announce that the watchman is in trouble. These watchman systems are as tamper-proof as possible, making it impossible for anyone to alter them on the spot to cover for a watchman who has been put out of action. Although intended primarily as burglar alarms, such devices make it possible for a single guard to send for immediate aid if he has detected a saboteur or has seen some damage.

Special Guarding Problems

ALMOST any plant has a special problem—some weak point that is difficult to cover effectively. Such a spot might be a waterfront line in a crowded area. Here, fences are sometimes effective if the land is solid, and spring floods cannot wash out the banks. Lighting, too is useful; and with alert guarding, is probably the best answer in most cases. But the photo-electric eye might be a good method of covering the open area.

Trucking is always a weak point. Although many trucking companies have drivers who are bonded and who have been investigated for disloyal tendencies, a truck can carry a bomb easily into a plant. By far the best way to handle trucking—and railroad cars, too—is to have a separate unloading area, away from the plant, and to shift the cargos to and from the plant in company-owned equipment, operated by fully investigated and known-loyal personnel. For the cases where this is impossible, extra guards should be assigned to each truck entering the plant yard. They should control the truck and driver every minute of the time, and be armed to prevent sudden action. Even in a crammed plant, there may be a corner or open area where the truck can be unloaded or loaded away from any possible target.

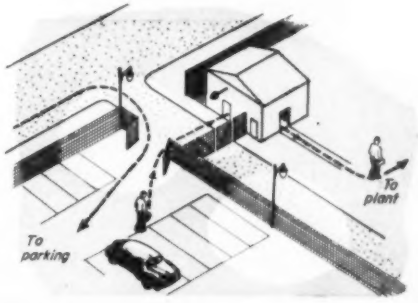
Contraband materials are also a touchy problem. Taking undesirable materials in, or sneaking valuable materials out is easy for the regular workman. Manufacturers of small assemblies that can be readily used in the home have had this problem for years. Considering that most workers who swipe valuable company materials in a sort of game spirit are rank amateurs, it can be seen that a worker planted in a factory for the purpose of stealing vital samples, important documents, and irreplaceable parts can wreck havoc if allowed to function long.

For the plant working on extra-valuable materials, the problem can be somewhat nullified by forcing all workers to change clothes at the plant. Taking off street clothes, walking through a shower or bare room, and changing into work clothes in a locker room forces the worker to leave contraband behind him. But without a legitimate excuse for such a ruling, the company will have trouble on its hands.

Special inspection aids help in some spots. X-ray equipment is expensive, but is effective in detecting metals. Fluoroscopes can be utilized, also for metals. But paper is a tough one to stop. In many plants, it may be possible to make spot strip searches on workers, taking only a small percentage each day. A great amount of public-relations work would be necessary, however, to get the workers to submit to such a check willingly.

Spot searches can be made by gate guards if they are not frequent and if they produce at least some sort of legitimate alibi for the action. Known filchers, for instance, can be shaken down; and on the strength of the guards' findings on him, men suspected of lifting company documents, records, and the like can be searched, too. However, good planning must be done to make this sort of thing effective.

Cameras, unless operated by plant photographers, should be outlawed in war plants. Microfilm records



Parking lot outside main gate reduces chances of penetration by large quantities of dangerous material; increases value of gate inspection; slows up surprise attack

and the cameras that take the shots are amazingly small, these days, and a skilled photographer can get a good shot of a forbidden subject in a hurry, if given half a chance. Reproduction machines within the company should be guarded and watched, to see that nobody makes copies of important documents for his own purposes. This would include blueprint machines, photostat machines, enlargers, photographic equipment of all kinds, and even mimeograph machines.

Critical supply lines, like gas, oil, water, electricity, and special fuels and liquids must be kept under observation at all times; a good way to do this is to run a weekly check on quality and quantity being delivered.

Inter-plant cooperation can be an important means of coping with emergencies. When all the plants in a given area are teamed up to coordinate their security efforts, the effectiveness of each security force is increased. Ten heads are better than one; and ten plants can think of better security methods than one alone.

Lighting

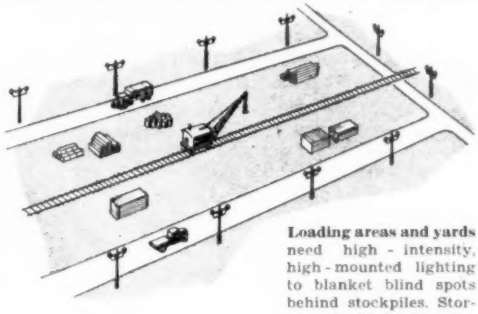
No criminal, political, military, or social, likes to work in the open. Good lighting discourages invasion of industrial properties; although it may not prevent all penetration, it certainly reduces the amount of trouble you can expect.

Protective lighting can do these things:

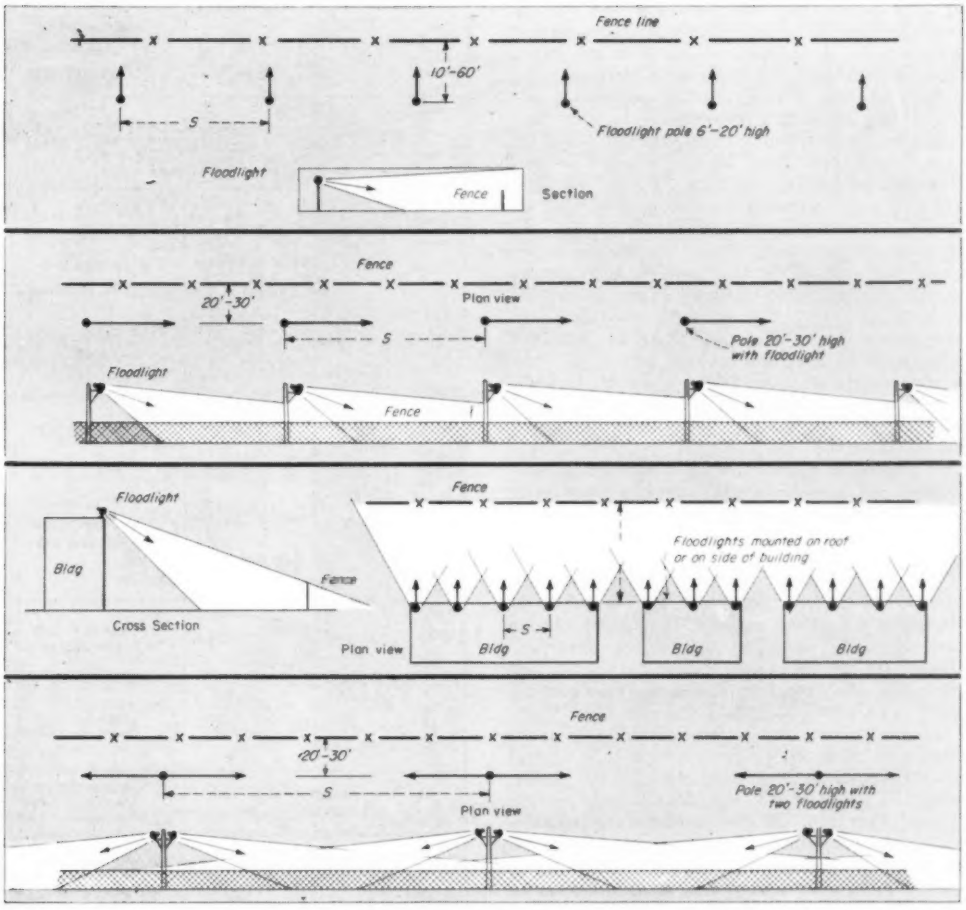
1. Discourage illegal entry
2. Increase chances of detection
3. Help the guard, hinder the intruder
4. Provide a reliable defense
5. Provide protective glare
6. Increase plant morale

Glare lighting follows the principle of blinding 'em. By mounting high-intensity floodlights all around the walls and fences of a property, the security force increases its own safety and reduces that of the intruder. There are several schools of thought on just how the lights should be mounted; none of them seeming to have advantages over the others.

One idea is to light the fences of the plant—and all border areas—brilliantly, disregarding the interior of the property. Placing lights on independent support poles a few yards (5 to 10) behind the fence throws light on the fence, some area behind it, and a lot of border area outside the fence. Placing the lights directly on the fence is not usually advisable, because then the wiring could be cut. This might



Loading areas and yards need high-intensity, high-mounted lighting to blanket blind spots behind stockpiles. Storage should be kept toward middle of yard; RR cars should be spaced out in single lines



Alternate fence-lighting methods use direct glare, longitudinal glare (in direction of guard's travel), direct glare from building roof, and wide-angle, two-way lighting. Spacing should overlap doubly, so one burnout will not leave a fence section dark

provide a good warning to the guards that something was wrong along the fence line, but the loss of light might also more than counterbalance that advantage. Double overlap of light from adjacent fixtures, however, would cut the light loss in such cases, and also when a burnout occurred.

Following the 'blinding' idea, some installations have the lights directed along the fence in the same direction as the watchman travels; and for plants where assigned, timed patrols are thought best, this has the advantage of keeping the guard from being blinded by his own lights. The plan implies a fixed patrol, however, which is not advisable for the plants that can manage to organize a checking schedule that cannot be timed or anticipated from the outside.

Other approaches to the lighting problem favor lights on the buildings themselves, directed outward or sharply down along the walls. This certainly illuminates the path the intruder must cross, but it may not be a wide enough path for him to be detected crossing; nor may it give guards warning sufficiently ahead of the time the intruder may get into the factory itself. Probably the best answer for yards with limited space is to set up a combination of lights; one set on the building directed outward; another set on independent poles away from the walls, directed toward the walls. Thus, a wide light corridor is formed around the building. One lighting authority favors a light band at least 75 ft deep around a building. This is a minimum; others recommend more.

Light is a good protection and deterrent to invasion only if it can be maintained at all times, and is reasonably tamper-proof. For this reason, power lines should be carried through underground conduits to far-flung fixtures; and when the lights are on the buildings, the lines should be raised high enough to be out of danger. Constant light is important, too. Preventive maintenance is called for; establishing a lamp-replacement schedule based on average lamp life. Thus, all lamps would be replaced before they would normally burn out. The good ones pulled out of protective fixtures could be utilized in less vital fixtures within the plant.

For maximum glare, lamps mounted to point toward the outside of the plant should not be mounted too high; but this idea is complicated by the fact that low mountings might interfere badly with normal plant operations. Interference with traffic, if roads pass nearby, is a factor, too. For lighting waterfronts, the plan should be checked with suitable authorities in control of the river, lake, or harbor to make sure it will not interfere with navigation.

For maximum useful lighting, fixtures should be mounted high to provide a diffused light. For areas inside the plant walls and fences, (work, storage, and shipping areas), the fixtures should have diffusing reflectors.

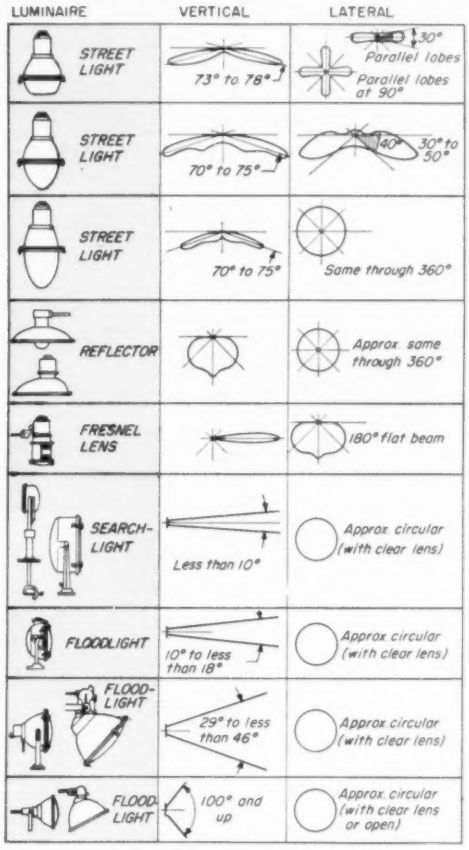
Emergencies mean that extra light will be required — but where, you can't tell in advance. Therefore, something portable should be handy. Portable power units, on trucks, are good insurance that trouble at your power station will not throw you into complete darkness. These can be rigged to plug into lighting fixtures to spark a set of top-priority fixtures, located to provide the most useful light when only limited power is available. Portable spot and floodlights mounted on small trucks and jeeps, with independent battery power, are good insurance, too. Also available are portable floods and spots run by acetylene gas or carbic action.

Every plant *should* have emergency switches to shunt off power from alternate lines—just as a normal peacetime precaution. Few do, however. Remote-control switches that can throw in fresh power from a distant transformer station provide a safety factor on the lighting system; and emergency agreements with nearby power stations, other plants in the area, and civic authorities in nearby towns are sensible precautions.

Remote-controlled special lights, set up at strategic locations in and around the plant, can be effective in an emergency. If these can be snapped on by a guard from a central control station, they may (1) blind, confuse, or otherwise hinder the intruder, (2) spot him for the guard who is nearby, (3) force him to flee from critical areas in the plant, and (4) provide at least psychological protection in the interval before the guard gets to the spot in danger.

Wherever possible, though, lighting for protection should not illuminate critical plant areas so someone outside the plant can get a good look, or a good sight, on his target by setting up a false alarm.

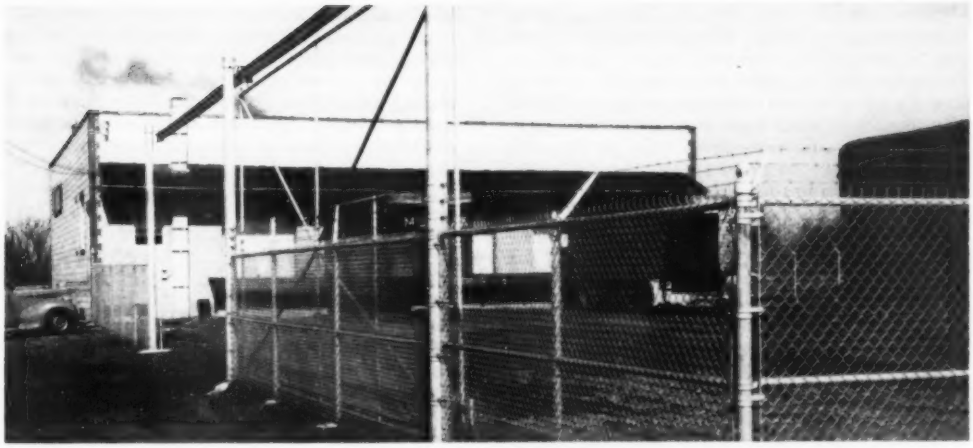
EQUIPMENT FOR PROTECTIVE LIGHTING



Lighting fixtures, with infinitely variable choices of reflectors, can provide many patterns. Patterns illustrated are typical of what is available

RECOMMENDED ILLUMINATING LEVELS FOR PROTECTION (Minimums)

LOCATION	FOOTCANDLES
Fences	0.2
Active gates	2.0
Locked gates	0.5
Building surroundings	0.5
Work areas (inside and outside)	5 to 50
Shipping areas	2.0
Vital equipment	2.0
Waterfronts	0.5



Automatic fence gates, powered by underground cables and protected motors, make gate security easier and more foolproof. Loading station, even if separated from main plant, should be equally well guarded and fenced

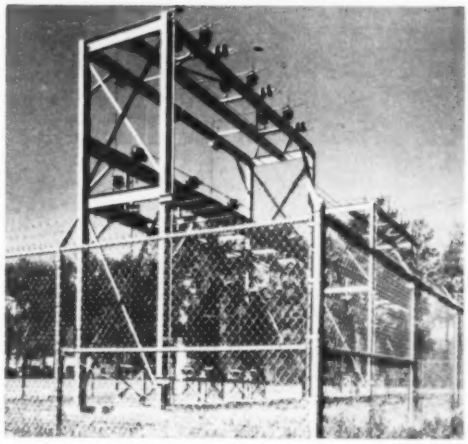
Fencing

As one security officer for a large plant put it: "We don't expect to keep anyone out with fences—but we do expect to keep them in long enough to get our hands on them."

There isn't a fence built that can't be gotten over, under, or around in some way—and often the best way is to go straight through the main gate. Yet, they have a valid use, and their installation is always recognized by insurance companies as increasing plant safety from penetration.

A single fence line, all around the plant, up to a height of 10 or 15 ft, is a good deterrent to anyone wanting to get in. A double fence is much more effective, psychologically and in fact. The fact that the fence is there implies protection, and makes the enemy agent immediately start thinking of easier ways to get in. Unless he is equipped with stilts—and they would probably be more dangerous to him than worthwhile—he cannot pass the fence easily. If the fence is old, weak, sagging, and supported by poor posts, that is another matter entirely. Then, the fence provides psychological safety to the plant force, but is actually a hidden entrance to the saboteur. Therefore, if you have a fence, it had better be a good one; or else you would be better off without one.

Whether or not fences keep people out, they can and do keep out vehicles. Characteristically, industrial fences are strong enough to withstand any normal impact, and almost any abnormal one. Therefore, they should be located to take the brunt of any attack they might be able to stop. If, for example, a saboteur wanted to crash a load of explosives through a fence and against a plant wall, the sure way of stopping him would be to surround the plant walls with a tough steel fence located far enough from the walls to prevent damage to them.



Outlying power equipment is critical; requires at least one sturdy fence, preferably double fencing. Patrol car running on irregular schedule or automatic signals (photoelectric, capacity switches, etc.) increase safety

Parking lots should be fenced, where practical, to separate them from the plant yards and from driveways leading to vehicle gates that must be entered by trucks. Extra-strength fences should surround outlying power plants, transformer stations, and as many supports for lead-in high-tension cables that feed power to the plant as seems practical. Fences can also wisely be thrown around any railroad trackage leading to the plant on factory land.

In all cases, fence foundations should be firm—usually concrete poured blocks with the steel uprights imbedded in them. As an added precaution against over-the-fence penetration, barbed wire along the tops is often utilized.

Fences can also serve to aid in detection of invaders. Capacity circuits and photo-electric circuits can be supported by fences to shoot a warning to the central security office when someone tries to go over the top. Although charged fences are not generally thought to be safe, there are some areas—open plains, as one instance—where this can be done, although suitable warnings should be posted. This last idea makes the fence preventative protection.

The places where fencing will not work are those where adjacent buildings into which saboteurs can easily get are too close to the industrial property. Putting up a steel fence against a solid building wall is a little silly; yet the wall must be under constant observation because it may be broken through.

Protection Against What?

At this writing, the war situation is still undecided. Whether it will continue a short time, indefinitely, or will stop soon is unknown; but in any case, one thing is certain: The armament program will continue, at least for some time, and as long as it does there is some danger from internal sabotage and espionage. These, mainly, are the dangers against which we must protect ourselves.

There are other dangers, too. These days, most plants are concerned with industrial safety to a greater extent than ever before. Accidents are a danger; and as has been proven time and again, accidents *can* be reduced. Not eliminated, but greatly reduced.

Unfortunately, one set of precautions against accidents will not be effective long; for, just as fences cannot keep out intruders, a given procedure for safety can become less effective. In many cases the workers themselves reduce this effectiveness by finding easier ways to do their jobs—thereby setting up a whole new set of accident-vulnerable practices.

Industrial safety is always important, but when a factory is in danger of being intentionally attacked, safety engineering is even more important. Sabotage that passes for an accident is always more effective than known sabotage, because accidents are expected, and if the saboteur is undetected, he may get a second or third chance at delaying or ruining production. It is the sabotage that looks like an accident that must be detected—so better protective measures may be taken.

Therefore, more-extensive-than-usual investigations should be held after accidents happen, and all employees should be well educated to understand this point, for they can help immensely. If a factory hand has an accident and reports it immediately, it may often be possible to determine the cause right away—especially if it was the hand's own fault and he admits it. Blaming him in any way for an honest accident is foolish, for it helps the saboteur and hinders later investigations. But if the accident wasn't his fault, and was no accident, the plant security force will be well on the way toward halting further such damage, and may have a good chance at catching the instigator.

As in all things for the general good of the company, the employees, and their producing effort, education is important. The working force should (and would want) to know what, generally, is being done about safety and security. However, there is a point at which free circulation of plant techniques should stop. At, for instance, the point where everyone knows you have armed guards doing irregular rounds at night—and during the day, too—but before everyone finds out, even roughly, the schedules of the guards. The plant force should know what, as another example, special devices, safes, blueprint rooms, and executive offices that contain important papers are guarded by concealed electronic devices during off hours, but nobody except the security officer and those he must inform should know too much about how they work, and where they are located.

Internal Security

Investigating each and every plant employee would be a tough, expensive, and inefficient job at most installations. Yet, some investigation is necessary. How do you pick men who might be dangerous?

Here, again, the employees themselves can help. If they are allowed to report, single or in groups, on peculiar personal attitudes, violent political harangues, and suspicious actions during the working day, you may pick up some useful information. The true enemy agent, the one who may actually do some damage, will probably keep his nose as clean as possible; yet nobody can maintain a pose indefinitely with absolute perfection. With everyone reporting on suspected disloyal personnel, you can expect a lot of crank information and misinformation; and running down all the leads will wear out a platoon of security officers. Common sense being the prime rule in such cases, first make sure your informant is trustworthy, honest, and has no personal axe to grind. Then, if he is to be believed, start on his information. Such files as are maintained by the FBI and other law-enforcement agencies are available for help to accredited security officers; and in some cases the FBI will investigate themselves. You may hear nothing from them, but if that happens, the best course is to forget the incident. If the man is found dangerous, the FBI will keep tabs on him; if not, the FBI may not want to let everyone know that persons are being checked.

Plant-wide fingerprinting, and plant-wide identifi-

cation files are, in most cases, useful and almost necessary. Fingerprints are a ready, efficient reference for investigations, as well as being positive identification, which may often work in the favor of the employee. Mug shots of personnel, even though they are often bad photographs, taken in a hurry, and processed with no thought toward art, are some help in gate-pass checking; are also good references for investigations of personnel when it is not desired that they know about it. Every plant should have some sort of file on all its people; even the one-horse-outfit. In this case, a file does not mean a suspect list—but simply a means of identification.

Inter-departmental travel is a danger in plants where regular peacetime work is done along side of defense work—or even in plants devoted entirely to government work. By confining the workers—therefore confining any one of them who may be working against the factory—it is possible to eliminate much danger from sabotage or espionage.

Color-coded badges or passes can be furnished all workers to indicate instantly to any guard, foreman, or fellow-worker the (1) shift, (2) home department, (3) classification of work, and (4) limitations on movement of the individual.

By investigating and picking carefully the men who must pass from department to department, the security staff can eliminate many troublesome or dangerous comings and goings. Included in those who should be known to be trustworthy are foremen, messengers, trouble-shooters, plant mechanics, electricians, millwrights, truck drivers, and so on.

Documents

BLUEPRINTS, production records, specifications, orders—all are targets of espionage agents. Their main objective is information; but few realize how much information can be gathered about a given plant without actually entering its gates. Methods of cutting down on the spread of involuntary information are not always completely effective; but the records within a plant should be made absolutely safe.

Lockups are a pain in the neck, but are effective—providing, of course, that the places where the records are locked up are really safe. Here is where the night watchman, central-office watchman service, and independent protective companies come in. Safes may be safe against common workmen; but experienced criminals can be bought to use their antisocial skills against a government or industry.

Therefore, records must be gathered up after every day's work, checked over to insure that all are present, and deposited in a vault, safe, or locked room. Then, a constant patrol has to be maintained to keep an eye on the lockup. Normally, this is a job that is handled as a matter of course by most plants; worked out as a matter of peacetime routine. In times of danger, the precaution must be checked over, investigated to see that it is effective, and maintained or increased in effectiveness.

Common Sense

THIS is the rule that should be considered first, above all others. With a liberal application of horse sense, pertinent knowledge and skills, and sufficient cash to establish a workable plant-protection method, an industrial factory can be made as safe from illegal penetration as anyone can expect it to be. Security forces cannot prevent bombs from falling; nor can they keep off enemy troops. But they can limit sharply the aid an enemy can steal out of a plant, and they can limit the damage they can do to the plants here. Not too many plants in this country have experienced direct sabotage, but security officers in those that have can testify to the real harm a single agent can do if he is well trained and equipped with the right tools. The chance is there; the risk is too great for us to fool around with halfway measures.

Plant documents, records, prints, and orders must be safe from tampering and prying. Lockup impenetrability depends on importance of material. Vital plant records can be microfilmed and stored separately to provide duplicates for emergency

Our special thanks . . . *go to the following companies and organizations for helping us gather material for this Special Report:*

American District Telegraph Co.
Atlas Fence Co.
Benjamin Electric Mfg. Co.
Crouse-Hinds Co.
General Electric Co.
Gould Storage Battery Corp.
Interlocking Fence Co.
Linde Air Products Co.
Page Steel & Wire Div.
Realock Fence Div.
Robertson Fence Co.
Robertson Steel & Iron Co.
South Bend Current Controller Co.
Sperry Gyroscope Co.
Westinghouse Electric Corp.
Federal Bureau of Investigation
West Hudson Council for Inter-Plant Coordination
Civil Defense Research Assoc.
Adjutant-General's Dept., State of Ohio
Military & Civil Defense Commission for Pennsylvania

$10 BUYS A LOT OF DISASTER

MUCH of the present apathy toward disaster control in Industry is a result of Management's fear of the cost being greater than the apparent threat of disaster. HERE is a dollar-and-cents approach to the problem— aimed at putting self-protection on a sensible financial basis

BY WM. M. STOCKER, JR., ASSISTANT EDITOR

How MUCH are you willing to spend, per employee, for organized disaster protection? Has the apparently exorbitant cost of self-defense preparedness kept you from taking even the first step?

Actually, 75% of an effective plant-defense program can be established at an average cost of $10 per employee. Management's thinking has been largely in terms of 100%, Class A, protection. But a Class A program consists of many details: organization, personnel training, equipment, and protective shelters. The expensive shelters, special equipment, and elaborate guarding systems make the price prohibitive. These steps are seldom essential for plants not engaged in critical or defense production; they are part of military contracts when needed.

What Will $10 Buy?

The $10-package offers an ever-ready organization, a well-trained nucleus of personnel, essential equipment, planned shelter areas, and, ultimately, improved employee morale. The plan also provides for expansion to a full defense effort if required.

Most of the $10 is spent largely for training and equipping personnel. Analysis, ingenuity, and thorough training will make each squad a capable defensive force.

First Aid—provides for 30 hr of training (American Red Cross Instructors Course) with payment to employees during training. Also, minimum of $250 per squad for supplies, (larger plants will require more).

This sum will purchase 2 stretchers, splints, bandages, dressings, and some medication. With ingenuity and improvisation, facilities can be made complete. For instance, skids can be converted to emergency stretcher ambulances; they can be kept available for use with a lift-truck when needed. Smooth towels and old bedsheets can be boiled clean, ironed and packaged as bandages. The $250 also provides personal equipment for each squad member, such as helmet (or armband), flashlight, whistle, and scissors.

Rescue and Salvage—provides for 50 hr of paid training, including classroom instruction, field demonstrations and actual practice. This training is usually available, on request, from fire and police departments, as well as from local utility companies.

The fund ($10) makes provision for personal and squad equipment, supplementing the normal maintenance and salvage tools. Supplies include personal equipment kit for each squad member, consisting of such items as: helmet, trench knife, hatchet, flashight, rope, pliers, gloves, chalk and whistle; also, essential squad tools such as axes, sledge, crowbars, floodlight, extra rope, grappling hooks and rakes. Again, skids can be used to set up a portable rescue unit for transportation where needed by lift-truck. This unit often will serve instead of a power vehicle which might otherwise be permanently tied up for that one prospective emergency.

Fire-fighting—provides for 30 hr of paid training in fire-fighting and use of available extinguishing equipment. Classroom and field instruction, plus familiarization practice, are contemplated.

Budget includes $300 per squad in the medium-size plant, and considerably more in the large plants, for personal and squad equipment. It is assumed that the plant has a normal quantity of hose, fire extinguishers, and fire-fighting tools.

If the work of the fire and rescue squads is coordinated, equipment can be pooled advantageously. Unit tools and supplies should be distributed around the perimeter of the building, rather than in the center. Here, skids can be utilized to provide mobile fire apparatus and auxiliary extinguishers without tying up expensive equipment.

Communications — provides for 20 hr of instruction on company time for radio or telephone personnel and unit messengers.

A portable radio per squad, plus equipment such as a helmet and a flashlight per squad member are included in this figure. Larger plants may include a portable field telephone (Army Signal Corps style) or other long range communication equipment.

Wardens—provides 1 warden for each 30 employees; permits 5 hr of classroom instruction on company time for each warden. This is primarily to assign duties and explain handling of personnel; also, to teach use of shelter areas. It is preferable if wardens have first aid training, but not essential. They should be taught pressure points, use of tourniquet, shock treatment, and artificial respiration.

Total allowance includes $7.50 per warden for armband, flashlight, and simple first aid packet.

Instruction is Usually Free

First aid training is available from the American Red Cross free

PROTECTION

SUGGESTED $10 PACKAGE FOR INDUSTRIAL SELF PROTECTION

EMERGENCY SQUADS REQUIRED	NUMBER OF EMPLOYEES AND COST: UNIT CREW 50 100	$	150 400	$	450 700	$	750 1000	$	2000	$	HOURS TO TRAIN	$1.50 AV/HR PER EMP	TRAINING COST PER CREW
FIRST AID	4	180	6	270	12	540	18	810	36	1620	30	$45	$270
RESCUE AND SALVAGE	4	300	6	450	6	450	12	900	24	1800	50	75	450
FIRE	3	135	5	225	7	315	7	315	14	630	30	45	225
COMMUNI-CATIONS	3	90	5	150	5	150	10	300	20	600	20	30	150
WARDENS	3	22.50	5/14	75	15/24	150	25/35	225	66	495	5	7.50	75
SUB-TOTAL TRAINING	17	727.50	32	1170	50	1605	77	2550	160	5145	135	202.50	1170
EQUIPMENT AND SUPPLIES													
FIRST AID		150		250		500		1000		3000			
RESCUE AND SALVAGE		100		100		300		500		1500			
FIRE		150		300		750		1000		3000			
COMMUNI-CATIONS		100		100		250		400		1000			
WARDENS		50		150		300		500		1000			
PSYCHO-LOGICAL		30		100		200		300		600			
MISCEL-LANEOUS		50		100		300		1000		2500			
SUB-TOTAL MATERIEL		630		1100		2600		4700		12,600			
TOTAL		1357.50		2270		4205		7250		17,745			
BUDGET		750		2750		5750		8750		20,000			
AVERAGE COST PER INDIVIDUAL EMPLOYEE		18.10		8.25		7.31		8.28		8.87			
EXCESS BETWEEN TOTAL AND $10 PER EMPLOYEE		0		480		1545		1500		2255			

of charge. Fire and police departments, or local utilities, can provide rescue training. Plant personnel can instruct in salvage procedure. Communications and warden groups can do self-teaching, have local specialists, and again, guidance from local police or amateur radio operators.

Plant arrangement influences the number of crews needed. This plan is based on one- and two-story, single building plants. Multiple stories and multiple buildings require one crew per floor or individual single-story building, for every group of up to 400 employees. Hence, a 5-story building having 200 employees per floor must have a minimum of 5 crews rather than 3, but if the number of em-

ployees is 400 per floor, 5 crews are still sufficient. Where employee groups number less than 300, the "package" costs about $20 per employee, rather than $10.

If team members forego training payment the cost is cut in half, or the money can be used for additional equipment or protective construction. It is, however, usually more efficient to pay employees for time spent in training.

Funds for psychological training supplies are included to permit the purchase of posters, pamphlets, films, identification cards, directional signs, and other aids for *all* employees. A clear picture of the program, plus direction if disaster strikes, will minimize future panic and reduce criticism or ridicule.

Remember that all employees need not be trained for disaster crews—although they all should be urged to learn first aid, correct use of extinguishers, the principles of fire-fighting, and self-preservation! A plant having 400 employees can be adequately protected, against anything but total destruction, by a force of 27 trained and organized people. Every employee in the plant should be assigned a "disaster duty," in line with his routine job, which is performed if the alert is sounded.

The Other 25%

To say "75% of a plant defense program can be established at reasonable cost" immediately raises the question: What comprises the other 25%?

The 75% used is figurative, in terms of value; not price. In some areas it might be 90% and in other, more critical, areas, only 60%. But organization and employee training are the essential elements of self protection. These important steps, together with a reasonable quantity of equipment and supplies, can be provided at an average cost of $10 per employee.

Reenforced concrete shelters, decentralization, expensive fire apparatus, structural changes, expanded inventories, and the numerous other material that form a complete, A-1, but costly program comprise that "other 25%." Secondary to the immediate need, this 25% equals 95% of the cost; might average $200 per employee, or more. It is important; may be needed eventually, and should be considered by plant defense advisory committees. Where these measures can be incorporated in new buildings, or plans for expansion, action now may save much additional trouble and expense later. But approach it logically. An established defense organization, plus a well trained disaster crew, and a knowledge of your plant's strength or failings will make the job a lot easier. Also, your plant will be protected *NOW*.

Executive time is not included in the "$10 package"; only employee training time and essential supplies, plus a small excess for miscellaneous expenses. It is expected that this problem is now an accepted responsibility of management—part of the many regular duties its calendar includes. Also, the plan does not include protective measures such as guards, fences, and lighting. Plants requiring these are usually in critical production and protective specifications are provided by the Munitions Board.

Organize For Efficiency

First, analyze the self protection problem in familiar terms, as any new, major business venture—or competitive threat.

1. Set up a preparedness advisory committee.
2. Determine whether plant is located in prime target area.
3. Is your product, or neighbor's product, critical?
4. How vulnerable are plant, operations, and supply sources?
5. Where are danger sources in plant structure, layout, utilities, and services?
6. What is possible (likely) danger cause, and degree of chance?

   A. Accident B. Sabotage C. Bombing D. Nature
7. What is possible result of accident, attack, sabotage, etc?

   A. Fire B. Blast C. Chemical Poisoning D. Flood
8. Based on this analysis, plan the extent or degree of protection needed, and the form it should take.
9. Appoint a Plant Defense Coordinator (*AM*—Nov 13, '50). Give him full powers.
10. Issue a questionnaire to each employee to determine his usefulness (past experience, training, hobbies, desire to take part in program, phobias, etc) to your defense program.
11. Prepare, in writing, a detailed plant-defense program.
12. Establish a definite target date for completion.
13. Set up defense squads, and a list of supplies for each team.
14. Arrange for training each team.
15. Start, or expand, psychological education program for all employees. Tell them what is being done to protect them, how they can cooperate, and what they can do to protect themselves. Encourage contributions to local American Red Cross Blood Bank. Use public-address system, bulletin board, company paper, films, local newspaper, personal letters, etc.
16. Examine plant housekeeping. Get everything in order, especially records and maintenance. Remove or protect seriously dangerous hazards; key equipment.
17. Assign shelter areas in locations offering maximum protection. Improve protection to the degree the committee feels is warranted by need, cost, and defensive gain.

Disaster control *is* important. It is important in peace as well as in war. It is too important right now to be sabotaged by ill-conceived and half-formed plans which, although usually well meant, are economically unfeasible.

Talk of 30-in. concrete-walled shelters, greatly enlarged medical programs, dozens of radiation detectors, rebuilding plants, decentralization of buildings, and many other such measures is enough to stagger the wealthiest comptroller, particularly if taken all at once. In this state of shock and uncertainty, nothing is done. Actually, the need is recognized; the measures mentioned are of value. But these are the optimum, the height of protection, the A-1 program; these are the needs of the day when dollars are secondary and only survival is important. Let's start with the simpler, and more important, measures; take first things first and build our defenses sensibly. The important thing is to *start*.

ROUND TABLE

Truth Party

"I'm calling the first meeting of a new shop committee this afternoon, Ed, and I want you to be on it. It's three of my own boys, changing off every meeting. The idea is to check how good a new man is, and where he should fit in."

"Nothing doing, Al! I'm not going to stick my nose into your troubles; I've got enough of my own. And why have your boys check up on a new man; can't you do it yourself?"

"Sure, Ed, but I figure that three of the boys would have a broader point of view. They'd do better than I would, and the new man would be less worked up over the whole thing. I want you, as an outsider, to sort of supervise things, and be tie-in for the meetings, passing on good ideas from one to the next."

"Like fun I will! I check my new men myself —and I check the old ones, too. That's the foreman's job, not a committee's. What are you trying to do, pass the buck to somebody else?"

"No, Ed. I'm just trying to get the worker's point of view on one of themselves. You know, they can see things that I can't, and I'm so busy I haven't got time to do the job right."

"So, because you haven't got time, you want to shove the job off on three other guys—and me, eh? I haven't got time either. What's more, I don't go for being a member of what the girls call a 'truth party'. I'll run my own department, but I won't get involved in yours."

"You don't have to get involved; just sit and listen, Ed. You've got all the savvy there is in this business; you know a good man and can give me ideas about possible assistants in the committees, too."

"For you or for me, Al? Why shouldn't I pirate any good ones for the toolroom? No, thanks; I'll stick to my way of doing my own talking and suggest you do the same."

"Nope, Ed; I want to give this idea a whirl. I think that if we pick men right in the first place, they'll fit into the gang better and we'll have better morale."

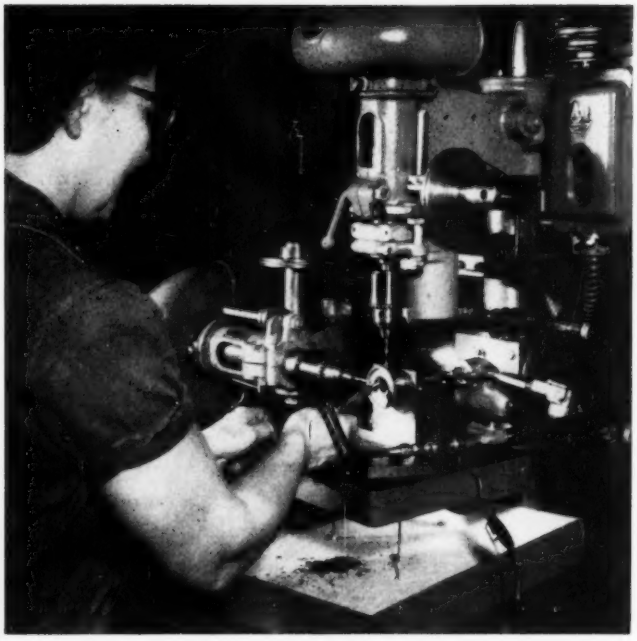
"Oh, now, you're going beyond the 'truth party', eh? You're going to use this committee as a club—an excuse to get rid of a guy you don't want! None of that for me."

"Not to get rid of anybody, Ed—necessarily. There may be some new men that would fit better in some other department, maybe even yours. They might be toolroom rather than production types. In general, though, the idea is to put the man where he's best, both for personality and for training."

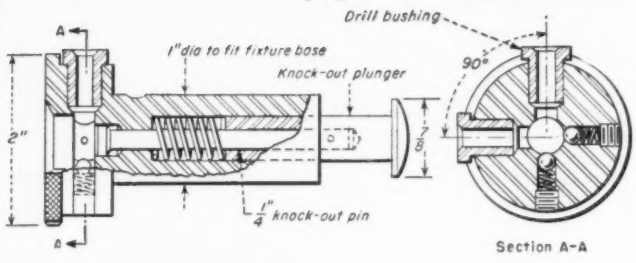
"And letting yourself in for some bigger ones. You put your boys in the jury box and make 'em take responsibility they don't get paid for. You put me on the spot, too. And you start the new man off by putting him on trial."

"He's on trial anyway, Ed . . ."

WILL SUCH A RECEPTION *or evaluation commitee work? Is it an unfair load on the men involved? How about the new employee? Your ideas and opinions will interest others. Discussions of earlier topics appear on later pages.*



Operator uses a pin-type hand tool to position work in the jig opening, then steps on a pedal valve to start the machine cycle. At the completion of cycle, the valve is reversed, returning the spindles to their original positions and actuating the knockout cylinder. The next piece is loaded onto the hand tool during the cycle. Tubing in foreground bends around to left-side drill-bushing opening and is presumably for blowing out chips



Section A-A

Jig bodies have spring-returned knockout pins and spring-loaded detents to hold work in place until drills start to cut. Two hardened-steel bushings guide the drills. Jigs are bored to suit work but have same dia barrels to fit one support bracket

ABLE ACCESSORIES AID DRILLPRESS

Air cylinders and special jigs and vises "dress up" drillpresses at Motorola. Result is increased production when cross-hole-drilling gear blanks and counterboring and rolling-over antenna ends

A SPECIAL Delta drillpress, with one spindle mounted vertically and the other horizontally, drills and taps cross holes for setscrews at our plant. Production is speeded by placing the work (gear blanks, collars, etc.) in a barrel jig having a knockout plunger actuated by a Mead air cylinder.

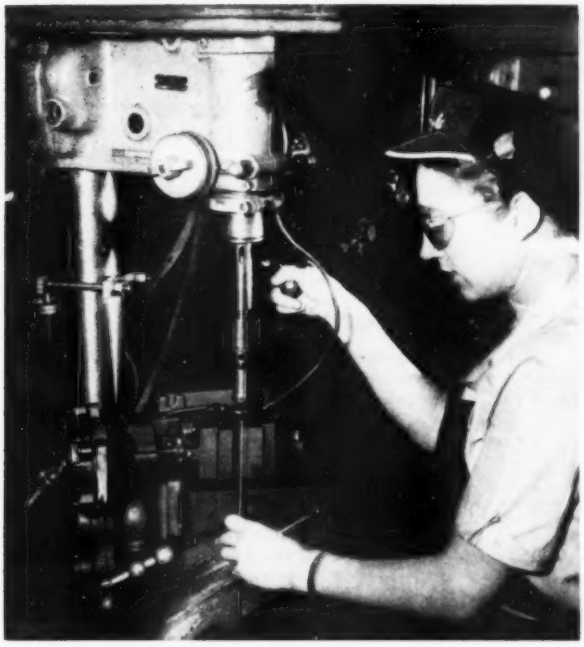
Jig bodies are interchangeable in a small steel bracket permanently mounted on the drillpress table.

A typical part is a 0.562-in.-dia brass pinion blank which is drilled for two No. 8-32 setscrews.

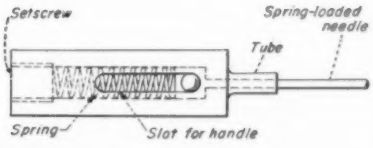
Finishing Antenna Ends

Upper ends of the two larger tubes in a three-tube collapsible radio antenna for autos are counterbored for insertion of washers, then rolled over to lock the washers in place. Operations have been simplified by using air-operated vises and mounting an automatic stop above the vise jaws for endwise location of the tubes while clamping.

Two 17-in. Delta single-spindle drilpresses are set up side by side on a workbench, the first tooled for



Drillpress is set up for rolling over end of antenna tube after washers have been inserted. It is equipped with a Brown air vise mounted on an angle plate and a Bellows air feed. Similar setup is used for prior counterboring by straight-fluted step drill. The brass tube is also beaded in another operation



Hand tool for inserting 3-washer sandwich (metal, rubber, metal) has a spring-loaded needle on which sandwich is assembled. The needle disappears into a tube which fits counterbore of antenna end

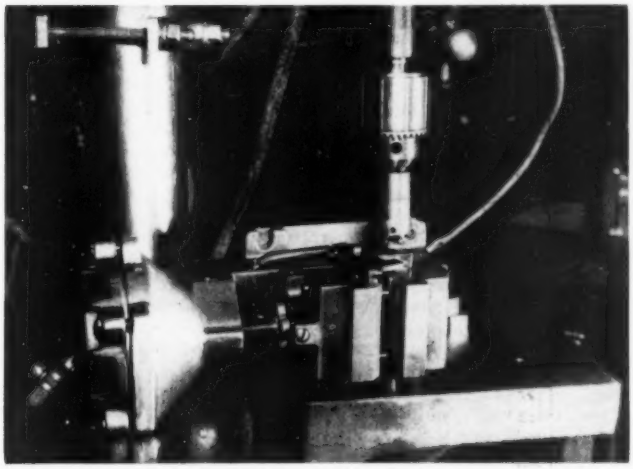
ACTION

BY ROY J. GOULD, Supt.
Mfg. Div., MOTOROLA INC.

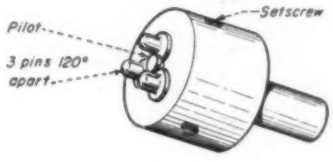
counterboring, the second for rolling.

Actuation of the drillpress feed automatically closes the vise, so all the operator need do is pick up a tube, position it in the jaws, and start the feed.

Counterboring averages 715 pieces per hr, washer insertion and roll-over about 222 per hr.

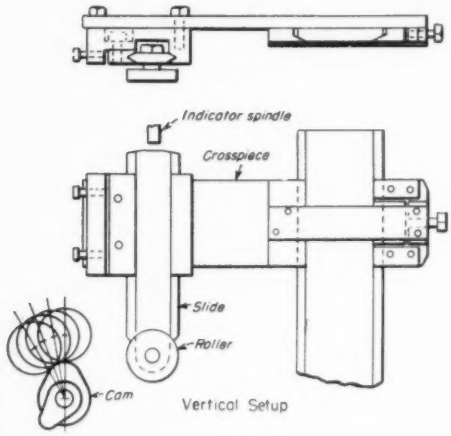


Jaws in Brown air vise have half-round slots to hold tubes and ¼-in.-dia pins to keep slots aligned. Spring-loaded swinging stop above jaw opening is pushed aside by cam when vise closes. Each piece of work is thus positioned at same vertical height, permitting automatic stops on drillpress spindle



Rolling tool for closing tube end has three pins spaced 120° apart around small pilot. Pins are stationary for smaller tubes—for larger they rotate to minimize wear

Practical Ideas



Vertical Setup

Cam Checker Tests Different Shapes

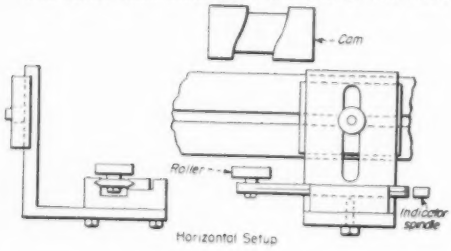
MEASURING THE CONTOURS of cams is a troublesome inspection job, especially when the cam is an experimental one where no regular test setup can be made.

This cam checker has a roller mounted on a dovetailed slide, which rides on a crosspiece supported by a vertical post. The rig can be mounted on a table, over a dividing head which will rotate the cam being tested. The rig could also be mounted on a lathe slide, with the cam held on a spindle chucked at the lathe head.

As set up vertically, the tester will indicate dimensions on a circular cam, with rise and fall dimensions taken from the top of the slide by means of a height gage or dial indicator.

As set up horizontally, the rig can be mounted with the slide horizontal over the lathe bed and with a barrel cam chucked. Here, a dial indicator must work horizontally from the end of the slide to indicate dimensions.

The roller that mounts on the end of the slide can be changed; being the same size as the follower roller that the cam is to operate, or maybe being the size of the milling cutter that has formed the cam. *R. H. Fry, Croydon, England.*



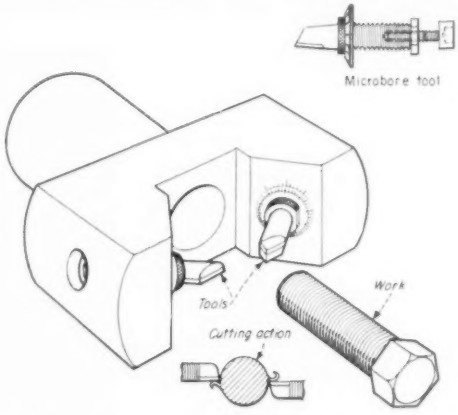
Horizontal Setup

Double Cutters Kill Turning Thrust

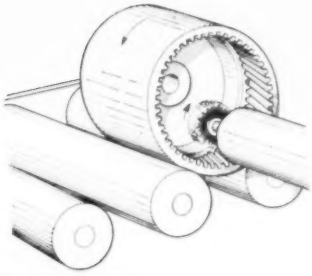
FOR HIGHER ACCURACY, DeVlieg Machine Co uses two carbide turning tools on a cathead to eliminate side thrust and spring on the work, which overhangs considerably. The job is turning long screw blanks from hex stock. Although threading is not done in this operation, it can be done with correctly ground tools.

Work is chucked in a collet, while the cathead is located in a turret position. Stock rides through the large bore in the head as the tools move up to the head of the screw.

The carbide-tipped tools are held in Microbore heads, which permit setting each tool positively to a 0.001-in. accuracy by means of a dial right at the toolbit. The tools are at 45° to the axis of the work; one right side up, and one inverted because it cuts on the rear of the screw.



Each head consists of a carbide-tipped tool welded to a threaded shank. Two lugs at the rear of the shank fit in notches in the cathead to keep the tool from rotating when it is adjusted. A socket screw in a tapped hole in the end of the shank locks the whole tool in position. Adjustments are made by loosening this socket screw, then rotating the tapped dial plate the required measurement, then relocking the socket-head screw. *Chester S. Ricker, Detroit, Mich.*



Roller-Spun Gears Get Deburred Fast

HELICAL INTERNAL GEARS for one of the automatic transmissions often are produced with burrs left at the inside edges of the teeth. When the gears leave the gearcutting machine, they are set on end to ride a roller conveyor. The operator of the next machine has some unused time, so he eliminates these burrs.

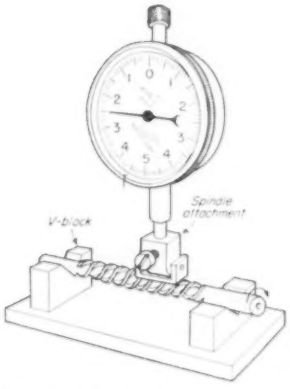
A 1½-in. wire brush is chucked in a small air motor to knock the rough edges off of the work. The operator tips over each gear to locate it parallel to the conveyor rollers, then gives it a spin with his left hand while he inserts the wire brush inside the gear. *George S. Milliken, Richmond Heights, Mo.*

Drilled Solder Bar Simplifies Wire Tinning

AT ONE TIME I did wiring work in a plant where specifications called for all stranded wire or cable to be tinned at the ends. The trouble with this was that the insulation often swelled when the wires were dipped in a pot; and the pot was always uncomfortably hot when placed near a bench.

To speed the job and prevent rejects because of damaged insulation, we took a small electrical stove—one of the two-burner type—and located that right at the workbench. Then we took a bar of copper and drilled holes—bottomed square—in it. One hole was 1 in. deep, another was ½ in. deep, and one was ⅛ in. deep, etc. All were 1 in. across.

These holes were filled nearly to the top with solder. Then, when the operator stripped the wires for tinning, he stripped off a length to match one of the holes—for example, ½ in.—then dipped the end of the wire in the ½-in.-deep hole. Solder never came quite to the top of the hole, so it never touched the insulation. The stove was not too hot, either. *Fred Lettino, Astoria, N. Y.*



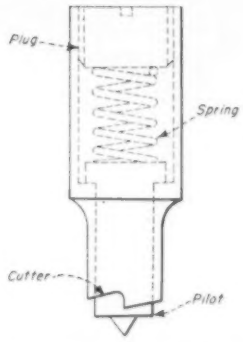
Dial Attachment Checks Screws

FOR INSPECTING SCREWS and worm gears for warp and parallelism of the threads, we utilize a dial indicator built up on a stand that holds the work between V-blocks. The indicator spindle is fitted with a block, pin, and flat yoke that bears against the screw; thus providing a bearing surface of at least three or four thread crests. The screw is rotated in the V-blocks to show up any warp or irregularity. *M. Yamaguchi, Kawasaki, Japan.*

Spring-Guided Center-Hole Cutter

PERFECTLY ROUND PILOT HOLES were recently required in some large sheet-metal disks. Not having a punch to do it, I designed this cutter to work on a drillpress.

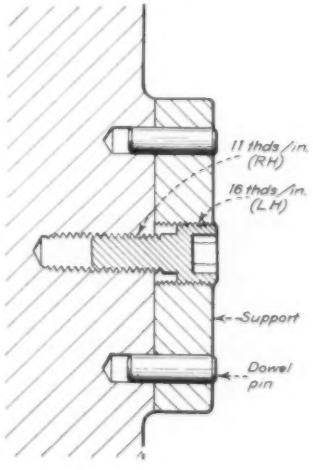
After each disk was center-punched, the tool was lowered. The pilot point engaged the center-punch mark; then the spring compressed as the drill was fed downward, and the cutter made the hole. The spring was installed to keep the pilot point in engagement during the cut, which prevented the cutter or work from slipping. *Gus M. Sciortino, Chicago, Ill.*

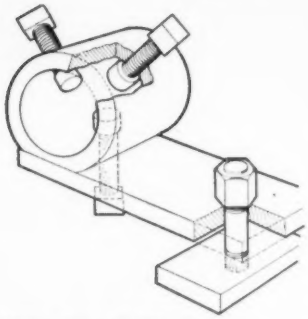


Differential Screw Has More Power

TO GET BETTER ACTION and a stronger pull when removing a support from a column on a machine, I made this differential capscrew.

The screw has 11 threads per in. on its OD, so I cut 16 threads per in. (left-hand) on the OD of the cap, which resulted in 27 threads per inch, in effect, when the cap is turned counter-clockwise with a wrench. This larger number of threads per in. produces a slower rotation, which allows more pressure to be exerted. *A. Vetsch, Steffisburgh Station, Switzerland.*

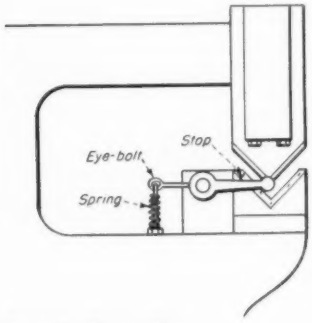




Light Steady Works On Heavy Lathe

THIS LITTLE STEADYREST was designed to support and center thin round work in a large lathe, where the regular steadyrest was too clumsy to be easily set up for this kind of light work. The whole works fits onto the compound rest.

There's nothing to it, really. The baseplate is fitted with a T-bolt and nut to fit the T-slot in the rest. A heavy collar at the end of the base carries three equally spaced screws with brass caps on their ends. These are adjusted to center the work. *Lee Williams, Cazadero, Calif.*

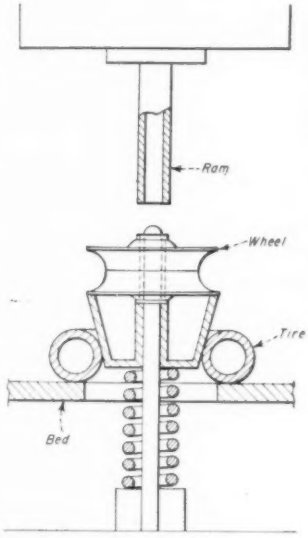


Sprung Shear Stop Pivots to Dodge Blade

ONE TIME I had to shear several hundred pieces of 3 by 1¾ by ¼-in. angle iron; but they were so short that we had trouble in setting the end stop. The regular stop would have been broken off each time the shear blade descended; while a stop attached to the blade would not work in this case.

The problem was solved by locating a stop between collars on the gage bar. An eye-bolt replaced the usual setscrew, and to this was attached a spring that was attached to the machine bed. This held the other end of the stop high enough to stop and jam the work at the correct position for shearing.

Each time the shear descended, the stop would be pushed down, but it would not break, and it always returned to the same place for the next piece of work. *Olin L. Brage, Spokane, Wash.*



Tire Assembler Simplifies Wheel Loading

ONE OF THE PARTS we make for an electric lawnmower is a tire wheel. We had trouble in assembling the tire to the wheel, and often produced a badly balanced wheel by our old methods. Now, however, we have a setup that makes a good assembly and keeps the balance good.

We place the tire on the press bed, then slip the tapered mandrel and wheel over the spring-loaded pilot. The hollow ram of the air press forces the mandrel down, which expands the tire until it snaps into the wheel rim. The tire assembly and mandrel are then removed from the press, and the next cycle is started.

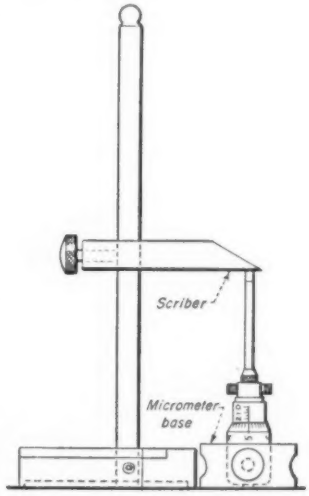
The spring acts as a buffer and to return the mandrel to start position. *R. L. Woods, S. Houston, Texas.*

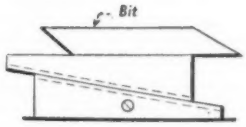
Two Inspection Tools Are Made Easily

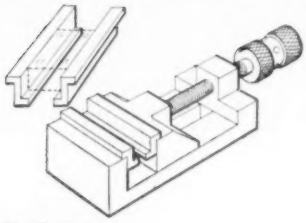
THERE ARE TIMES when you need a close measurement; not as accurate as a precision gage, nor as sloppy as a scale. For such cases this rough height gage can be easily and cheaply made.

It has a simple, flat base, a vertical rod, and a hardened scriber piece with a setscrew. Another base block is made to take an inside micrometer, which must bottom on the surface plate or workbench. Measurements are transferred in the same manner as if you were using a regular height gage.

Another simple inspection or gaging device can be made with adjustable (tapered) parallels, on top of which a scriber-pointed toolbit can be held. *William S. Ernest, Philadelphia, Pa.*

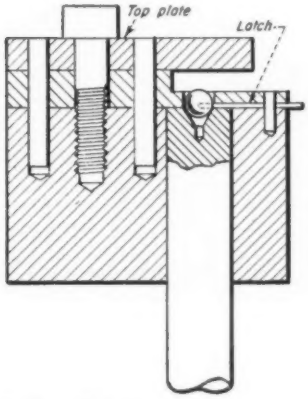






Hook Jaws Replace Vise Parallels

THESE S-SHAPED JAWS for ordinary bench vises can be made in many sizes to replace parallels used with the vises. They also allow diemakers to drill holes in the clamped work close up to the edges of the jaws. *Peter Opanowicz, Newark, N. J.*



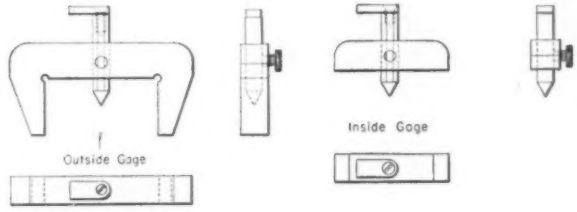
Center Gage Inspects Turned Stock

WHEN CRITICAL lateral dimensions along turned work are measured from one end of the stock, the depth of the centerdrill cut is important. For these cases we utilize this kind of gage, which checks the center holes before the stock is set up between centers.

The gage body has a vertical hole to take the rough-turned or partly turned stock. A bearing ball is held between this body and the top plate of the gage, while the middle plate positions the ball over the hole in the end of the work. Thicknesses of the plates are calculated and accurately ground so the ball cannot fall out of the slot. In addition, the plates are made so the ball will project from the center hole slightly above the shoulder of the middle plate when the center hole is the correct depth. This allows placing a gage block between the top of the ball and the bottom of the top plate.

If a gage block of the exact required dimension will not slip between the plate and the ball, the center hole is too shallow. If a gage block of the same thickness plus the tolerance for the job will slip in here, the cut is too deep.

A latch is pinned between the middle plate and the base so it can be pivoted in toward the ball to lift it and hold it in the slot between the plates. This prevents its being dropped out when the workpiece is removed and a new one is being inserted. *Robert Mery, Farmingdale, L. I., N. Y.*



Geometric Micrometers Gage Partial Curves

LARGE-DIAMETER WORK sometimes has to be measured accurately. When micrometers of the right size are not available, or when only part of the arc of a circle is available, these special tools do the job.

All parts of the gages are hardened tool steel, with dimensions accurate and edges sharp. One gage is for outside dimensions, so the inner edges of the yoke must be especially sharp and accurate. For the ID gage, the OD's are critical.

Each gage is utilized as illustrated. When a gage is set, the projection of the spindle can be easily found with a depth micrometer. Then the calculations are made:

For either gage . . .

$(C + X)^2 = D^2 + B^2$

$D^2 = X^2 + A^2$

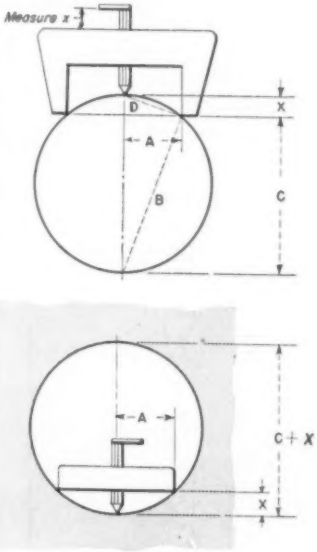
$B^2 = A^2 + C^2$

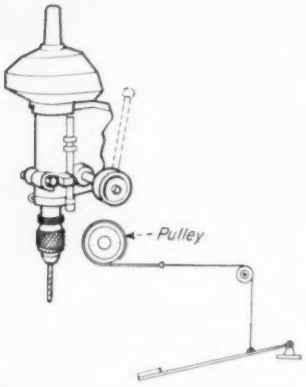
$C^2 + 2CX + X^2 =$
$X^2 + A^2 + A^2 + C^2$

$2CX = 2A^2$

$C = A^2 \div X$

The convenient way to make the gages is to machine them so the dimension A on each gage is 1 in. Thus, the final diameter of a measured curve must be C plus X or X plus $\frac{1}{X}$ This formula can be stamped on each gage to reduce errors in calculating. *O. F. Lambert, Columbus, O.*



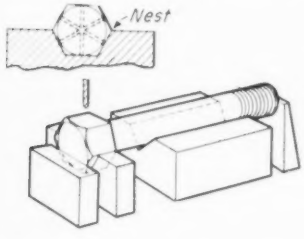


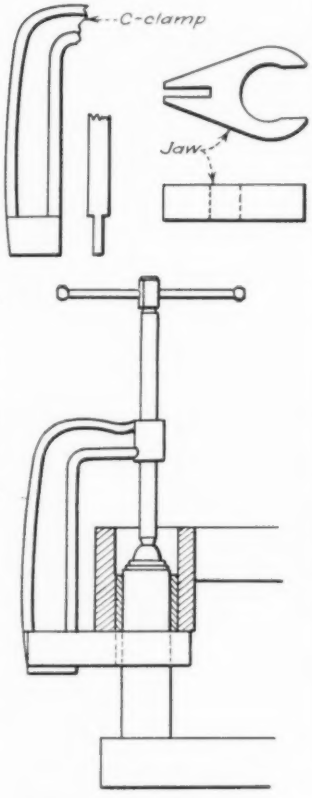
Feeding Small Drillpresses

IT IS COMMON PRACTICE at A C Spark Plug Div of G M C to operate all sensitive drillpresses on production jobs by foot, leaving operators' hands free to hold and handle the work. A small wood or steel pulley replaces the operating arm or capstan handle, and a belt, treadle, and cable are added. A spring returns the spindle to "up" position.

A most unusual drillpress feed is utilized at N. W. Woodworth. Small, hex-head aircraft capscrews are cross-drilled with the screws held in hex- and V-shaped troughs. It takes three operations to drill the holes perpendicular to each face of the screw head.

One of the girls in the department asked for the job one day when the regular man failed to show up. It was a piece-work job. The first thing she did was remove the capstan drum from the drill and start feeding the spindle by twirling the hub with her fingers. The drill ran at high speed, and the weight of the spindle was almost enough to feed itself, so finger pressure was enough to operate the feed. She tripled production and quickly ran out of work when she eliminated the slower arm motion. *Chester S. Ricker, Detroit, Mich.*





Altered C-Clamps Separate Die Sets

TWO HEAVY-DUTY, 8-in. C-clamps were taken, the lower jaws were sawed off, and yoke jaws were dovetailed and welded on to disassemble die sets. The jaws might be bolted, if preferred.

As illustrated, the clamps make separating die sets easier and much safer. The clamps have a 2¼-in. throat depth, which will clear guide posts up to a 2-in. dia.

The yokes were machined to clear the bushings. *Erwin Werner, West Bend, Wis.*

$25 *In addition to regular payment*

for the best PRACTICAL IDEA

An extra payment of $25 will be made for the best Practical Idea in each number of *American Machinist*. To avoid bias, the selection will be made by readers, a different group each time.

PAYMENT—$25 in addition to regular rates for the item as published, to be paid as soon as reader votes are received—usually three to four weeks after the date of the issue. The winner will also be announced in these pages as soon thereafter as practicable.

JUDGES— A group of 200 *American Machinist* readers is asked to select preferred articles in each issue. The group is a true cross-section of all readers, and changes entirely each time. Their votes, in addition to guiding the editors, select the best Practical Idea. If at any time their votes result in tie, $25 will be paid to each and every co-winner. Decision of the readers will be final in each case.

REQUIREMENTS— Only items in the Practical Ideas pages are eligible, and they must be submitted directly by the originator. Do not worrry about your shortcomings as a draftsman, photographer or author —every item will be edited in accordance with *American Machinist* standards and suitable illustrative or explanatory material added where needed. Readers will judge only the finished product—in terms of its usefulness to them.

WHO MAY ENTER — Anyone may enter except employees of the McGraw-Hill Publishing Co., Inc., and those of advertising agencies or departments. Suggest to your employees that they submit ideas.

HOW TO ENTER – Send your entry to "Practical Ideas Editor," American Machinist, 330 West 42d St., New York 18, N. Y.

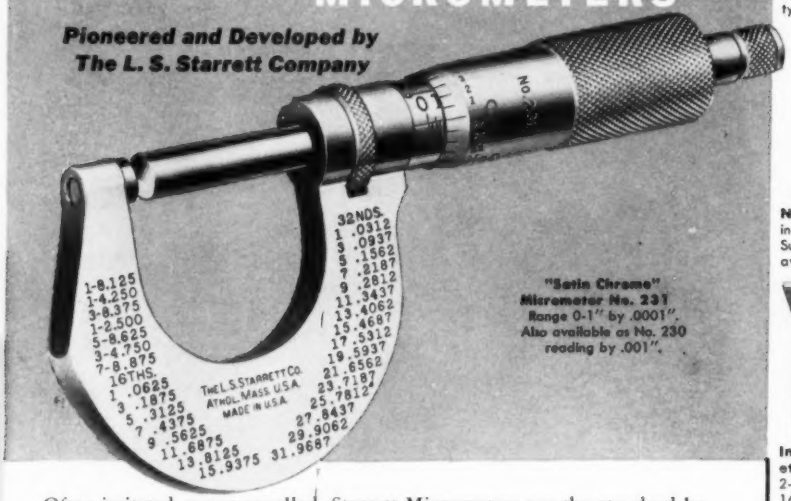
128th Winner:
(For May 14 issue)
W. W. QUIST
Manual Threading Die

Two Machines Process Transmission Extensions*
CROSS
CROSS 126
CROSS 127
CROSS
CROSS
OPERATION 1
OPERATION 2
★ Operation 1: bore both ends; face large end; ream flange holes in large end; oil groove small end; chamfer and tap two holes in mounting flange.
★ Operation 2: mill mounting flange; drill, bore, chamfer and tap speedometer hole complete; drill, chamfer and tap two inspection cover holes.
★ 125 pieces per hour at 100%.
★ Features: J.I.C. standard construction; power operated indexing trunnions; fluid motor drive for indexing; single point tool for cross-facing flange of large end.
*Except for finish bore
Established 1898
THE CROSS CO.
DETROIT 7, MICHIGAN
Special MACHINE TOOLS

Specify Starrett

SATIN CHROME MICROMETERS

Pioneered and Developed by The L. S. Starrett Company



"Satin Chrome" Micrometer No. 231 Range 0-1" by .0001". Also available as No. 230 reading by .001".

Often imitated, never equalled; Starrett Micrometers are the standard by which others are judged. Precision made throughout by Starrett precision methods based on 70 years of micrometer manufacturing know-how . . . *plus* 12 big features that insure better, faster measuring. Ask your distributor to show you Starrett Micrometers designed to simplify *your* precision measuring jobs. You'll agree, they're the finest micrometers ever to carry the Starrett name.

INSIST ON THESE BIG FEATURES

For Better, Faster, Precision Measuring

1 TAPERED FRAME — Permits measurements in narrow slots and tight places. Standard on all full finish outside micrometers.

2 CONVENIENT DECIMAL EQUIVALENTS — Of 8ths, 16ths, 32nds and 64ths on frame or thimble.

3 HI-MICRO MIRROR FINISH — On faces of anvils and spindles insures more accurate measurements. Also available with tungsten carbide faces for severe abrasive conditions.

4 ONE PIECE SPINDLE — For long, accurate life.

5 QUICK READING FIGURES — Every graduation numbered for positive identification.

6 LOCK NUT — Permits locking of spindle at any reading. Available at slight additional cost.

7 SIMPLE SLEEVE ADJUSTMENT — Maintains Starrett accuracy.

8 SATIN CHROME FINISH — On thimble and sleeve of all micrometers and on frame of all full finish micrometers.

9 NO GLARE — Easy reading Satin Chrome Finish eliminates squinting and eye strain.

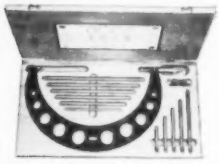
10 RESISTS RUST — Satin Chrome Finish highly resistant to stains and corrosion.

11 HARDENED THREADS — Ground from the solid and stabilized to insure lasting precision.

12 RATCHET STOP OR THIMBLE FRICTION — Permits consistent measurements independent of "feel" — Available at slight additional cost.

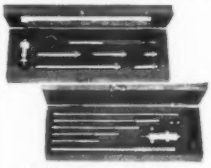
Tubular Micrometers No. 724 — Bow type. Light yet rigid for precision measurements on large work. Standard sizes up to 60". Larger sizes on special order. Bar types also available.

Black Frame Micrometers No. 436. Range 1" by thousandths in 24 sizes from 1 to 24 inches. Supplied singly or in sets. Also available with .0001" graduation.



Interchangeable Anvil Micrometers No. 224 — Ranges 0-4, 2-6, 6-9, 6-12, 9-12, 12-16, 16-20 and 20-24 by .001". Available singly or in sets. Interchangeable anvils mean big capacity plus saving in tool equipment.

Steel Mill Micrometers No. 205. For gaging hot metal. Heavy duty spindle, heavy cut graduations, wing head lock nut, "Satin Chrome" finish. Range 0-1".



"Satin Chrome" Inside Micrometers
No. 823 — with tubular rods.
No. 124 — with solid rods.

STARRETT TOOLS

TRADE MARK
Starrett
REG. U.S. PAT. OFF.
SINCE 1880
WORLD'S GREATEST TOOLMAKERS

THE L. S. STARRETT COMPANY · ATHOL, MASS., U.S.A.

BUY THROUGH YOUR DISTRIBUTOR

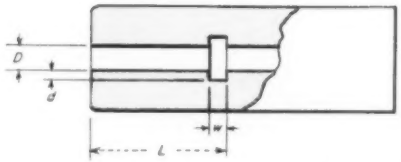
MECHANICS' HAND MEASURING TOOLS AND PRECISION INSTRUMENTS
DIAL INDICATORS • STEEL TAPES • PRECISION GROUND FLAT STOCK
HACKSAWS, BAND SAWS and BAND KNIVES

American Machinist REFERENCE BOOK SHEET

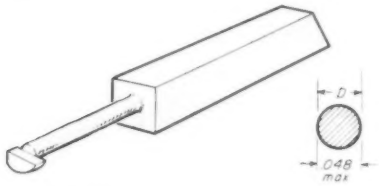
Maximum-Strength Recessing Tool..I

BY JOHN R. NICK

ACCURATE recessing, or undercutting, in small, deep holes is always a problem. Greatest difficulty is to provide an accurate tool with sufficient strength in the weakest cross-section. A concentrically ground shank is limited in diameter by the available clearance in the hole. By grinding the shank eccentrically in a simple fixture, a much stronger cross-section is obtained.

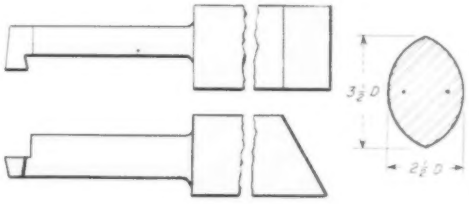


RECESS TO BE MACHINED
D = 0.188 L = 1.000
d = 0.060 w = 0.070



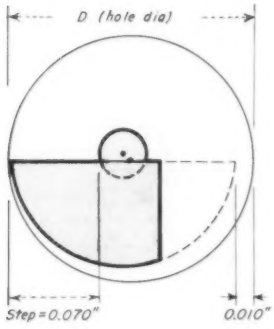
CONCENTRICALLY GROUND TOOL

Freehand grinding of a recessing tool requires much skill and the shank is weak

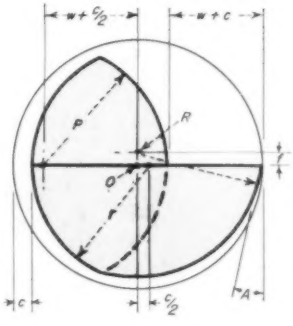


MAXIMUM-STRENGTH TOOL WITH ECCENTRICALLY GROUND SHANK

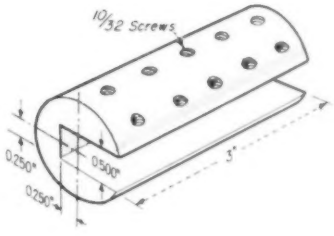
GRINDING PROBLEM AND FIXTURE



CONVENTIONAL TOOL
Shank dia. = 0.038 in.

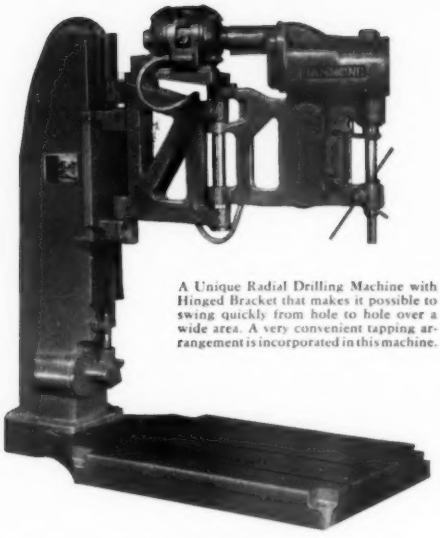


ECCENTRIC-GROUND TOOL
R = hole radius practically
P + r = hole radius − c/2



GRINDING FIXTURE
takes up to ½ in. toolbits

A very accurate 6" x 18" Hand Feed Surface Grinder especially adaptable for Tool Room Work and work on small, fussy pieces.



A Unique Radial Drilling Machine with Hinged Bracket that makes it possible to swing quickly from hole to hole over a wide area. A very convenient tapping arrangement is incorporated in this machine.

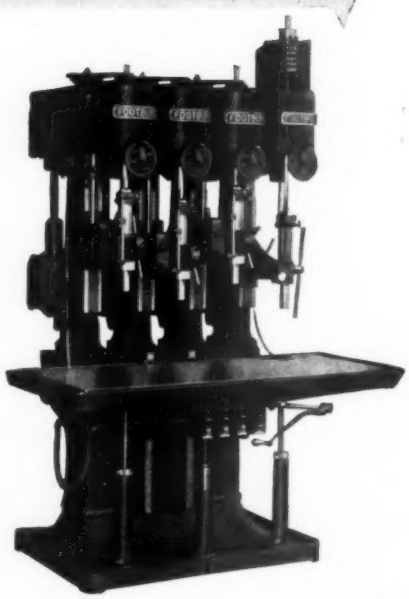
A TIME TESTED LINE OF MACHINE TOOLS

engineered for production

• The choice of fine machine tools is an investment for future profits when products have to be made with increased accuracy and efficiency. • These machines are built with the usual Footburt workmanship and sturdiness that will keep them accurate over a long period.

THE FOOTE-BURT COMPANY • Cleveland 8, Ohio

Detroit Office: General Motors Building



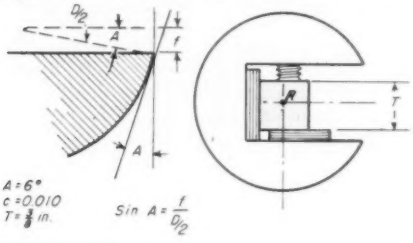
Built in 1, 2, 3, 4 and 6 spindle models, also as a tool room drilling machine, these sensitive drilling machines are accurate for the most exacting work and have the usual Footburt sturdiness of construction to make them suitable for continuous production line work. The above 4 spindle machine has tapping attachment and power feed attachment.

FOOTBURT machine tools

Maximum-Strength Recessing Tool..II

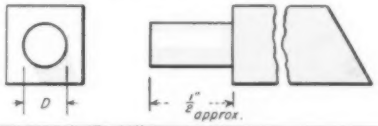
LOCATION OF RECESSING TOOL IN GRINDING FIXTURE

Operation 1.. *Shim to put R at center of fixture for first grind*

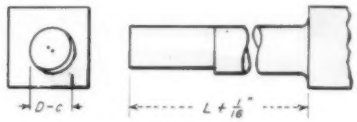


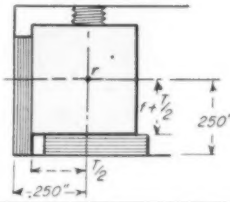
Bottom shim = $0.250 - \frac{(T + D \times \sin A)}{2} = 0.053$ in

Back shim = $0.250 - \frac{T}{2} = 0.063$ in.



Operation 2.. *Shim to put r at center of fixture for eccentric grind*

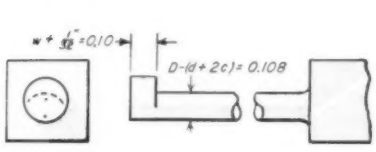


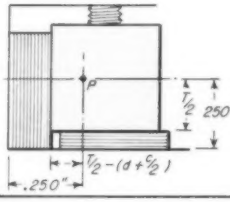


Bottom shim
$= 0.250 - \frac{T}{2} = 0.063$ in

Back shim
$= 0.250 - \frac{(T+c)}{2} = 0.058$ in

Operation 3.. *Shim to put P on center of fixture*

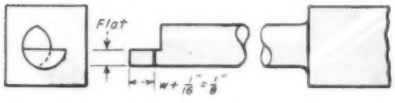




Bottom shim
$= 0.250 - \frac{T}{2} = 0.063$ in.

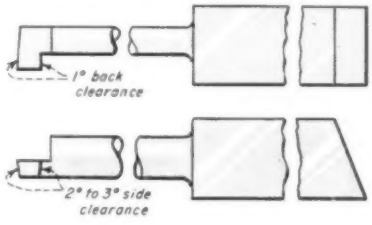
Back shim
$= 0.250 + d - \frac{(T-c)}{2}$
$= 0.128$ in

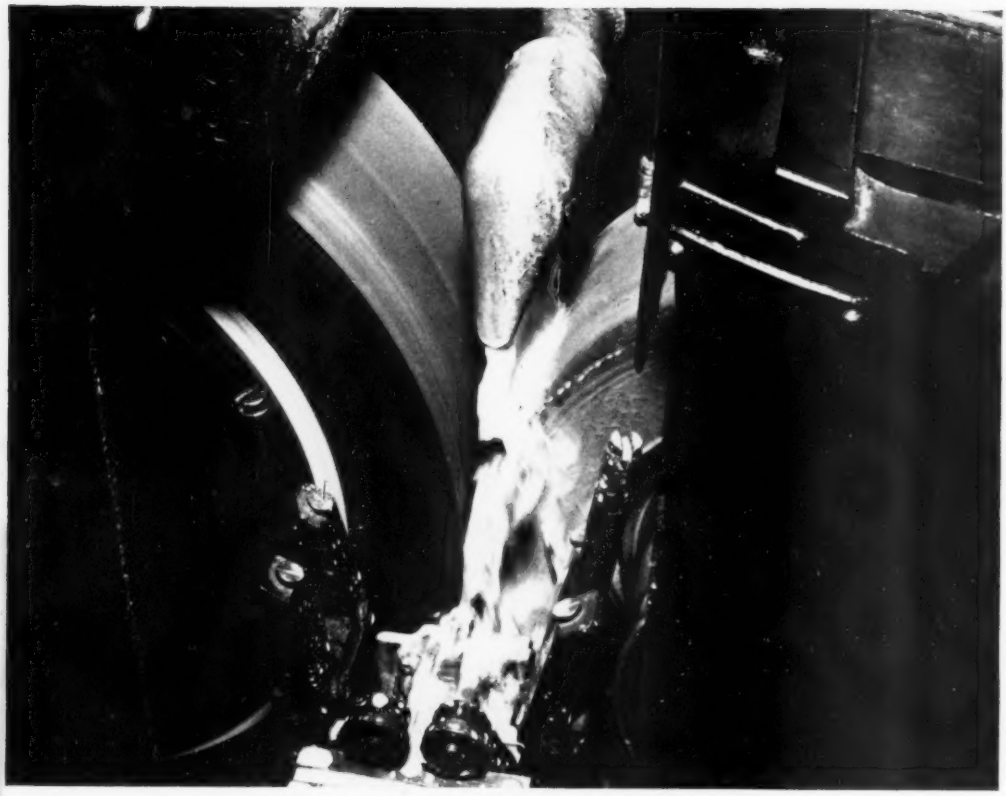
Operation 4.. *Grind flat*



$Flat = \frac{D}{2} - f = D\frac{(1-\sin A)}{2} = 0.084$ in.

Operation 5.. *Grind side and back clearance*





PRODUCTION ON CENTERLESS GRINDER

multiplied 5 times per wheel-dressing

Cotter-pin bridge rivets were centerless-ground with Robertson wheels on Cincinnati No. 2 centerless grinders like the one shown in the photograph above.

How to increase production is a matter of vital import in every plant in the country. Here's how one manufacturer licked the problem:

He had the job of manufacturing cotter-pin rivets for temporary bridge structures. In grinding these from drop forging, he was getting only 25 rivets per wheel-dressing, taking off 1/16" stock on a plunge cut. This was not fast enough.

A Robertson engineer was called in, and, after studying the problem, recommended a Robertson SA54-QV wheel. Production was increased to 125 rivets per wheel-dressing—an increase of 400 percent.

Whether you are working on steels of various analysis and hardness, on other metals, such as cast iron, brass, bronze, aluminum or on materials like Steatite or plastics, Robertson grinding wheels are designed to give you a combination of high production, quality finish and low cost.

One reason why a Robertson wheel was so successful in this application, as it has been in many others, is that we knew firsthand all the details of this manufacturer's problem. We were able, therefore, to give him a wheel of the proper grain and grade to do the job and do it right.

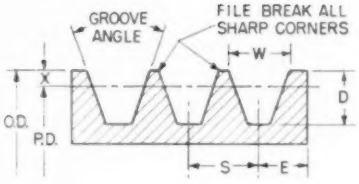
Be sure to blueprint the full details of your problem when writing, and you will be sure to get a wheel that gives you a substantial bonus in production time.

ROBERTSON MANUFACTURING CO.
TRENTON 5, NEW JERSEY

RESIN-BONDED AND VITRIFIED-BONDED GRINDING WHEELS • MOUNTED WHEELS • SEGMENTS

V-Belt Sheaves

SHEAVES



Outside rims or faces of sheaves are grooved to work in conjunction with standard multiple V-belts. Sheaves may be cast iron, steel or other materials. All grooves are to be smooth and the edges rounded.

Face Width $= S\ (N - 1) + 2E$
Where N = Number of grooves

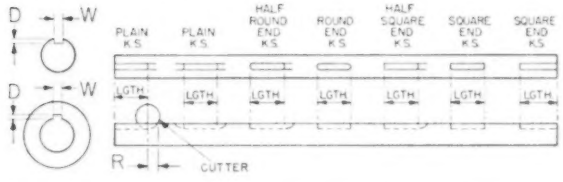
Standard Groove Dimensions

Belt	Minimum Recommended Pitch Diam.	Pitch Diam.	Groove Angle	W	D	X	S	E
A	3.0	2.6 to 5.4 Over 5.4	34° 38°	.494 .504	.490	.125	5/8	3/8
B	5.4	4.6 to 7.0 Over 7.0	34° 38°	.637 .650	.580	.175	3/4	1/2
C	9.0	7.0 to 7.99 8.0 to 12.0 Over 12.0	34° 36° 38°	.879 .887 .895	.780	.200	1	11/16
D	13.0	12.0 to 12.99 13.0 to 17.0 Over 17.0	34° 36° 38°	1.259 1.271 1.283	1.050	.300	17/16	7/8
E	21.0	18.0 to 24.0 Over 24.0	36° 38°	1.527 1.542	1.300	.400	13/4	11/8

Deep Groove Dimensions

Belt	Minimum Recommended Pitch Diam.	Pitch Diam.	Groove Angle	W	D	X	S	E
A	3.0	2.6 to 5.4 Over 5.4	34° 38°	.589 .611	.645	.280	3/4	7/16
B	5.4	4.6 to 7.0 Over 7.0	34° 38°	.747 .774	.760	.355	7/8	9/16
C	9.0	7.0 to 7.99 8.0 to 12.0 Over 12.0	34° 36° 38°	1.066 1.085 1.105	1.085	.505	11/4	13/16
D	13.0	12.0 to 12.99 13.0 to 17.0 Over 17.0	34° 36° 38°	1.513 1.541 1.569	1.465	.715	13/4	11/16
E	21.0	18.0 to 24.0 Over 24.0	36° 38°	1.816 1.849	1.745	.845	21/16	15/16

STANDARD KEYSEATS



Shaft Keyseat. Always make straight, never taper. Use regular depth in shaft, even though shallow depth is used in hub.

Hub Keyseat. Make straight, unless a taper keyseat is specified. Make regular depth, except when shallow depth is specified.

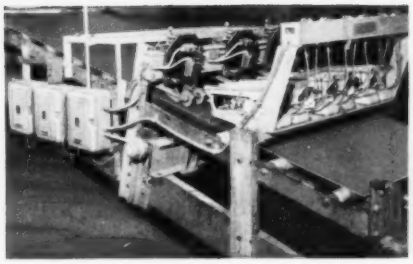
Taper Keyseat. Use 1/8 in. per ft. Depth at large end equals *D*.

*Tolerance on Depth:
Shaft keyseat: + 0.010 – 0.000 in.
Straight keyseat in hub: + 0.010 – 0.000 in. (preferably + 0.010 in.)
Taper keyseat in hub: + 0.000-0.010 in. (preferably – 0.010 in.)

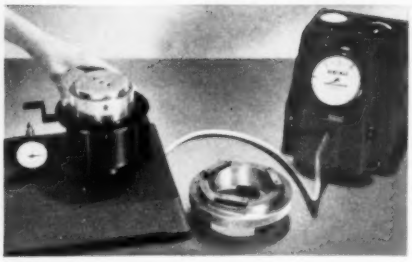
Shaft Size	W Width +.002" –.000"	*D Depth Regular	*D Depth Shallow	R Max. Cutter Runout	Max. Diam. of Cutter
5/16—7/16	3/32	3/64	.....	1/32	3 1/4
1/2—9/16	1/8	1/16	.....	9/16	3 1/4
5/8—7/8	3/16	3/32	.....	11/16	3 1/4
15/16—1 1/4	1/4	1/8	.....	13/16	4
1 5/16—1 3/4	3/8	3/16	.....	1 1/16	5
1 13/16—2 1/4	1/2	1/4	1/8	1 3/16	5
2 5/16—2 3/4	5/8	5/16	3/16	1 5/16	5
2 13/16—3 1/4	3/4	3/8	3/16	1 9/16	5 1/2
3 5/16—3 3/4	7/8	7/16	1/4	1 11/16	5 1/2
3 13/16—4 1/2	1	1/2	1/4	1 3/4	5 1/2
4 5/16—5 1/2	1 1/4	5/8	1/4	1 15/16	5 1/2
5 5/16—6 1/2	1 1/2	3/4	1/4	2 1/8	5 1/2
6 5/16—7 1/2	1 3/4	3/4	1/4	2 1/8	5 1/2
7 5/16—9	2	3/4	3/8	2 1/8	5 1/2
9 1/16—11	2 1/2	7/8	3/8	2 5/16	6
11 1/16—13	3	1	3/8	2 7/16	6

Data on this page supplement "Multiple V-Belt Drives," *AM*—July 9, 1951, pp 179 and 181. *Copies of the new standard are available from the Multiple V-Belt Drive & Mechanical Power Transmission Assn., 7 West Madison St., Chicago 2, or from the Rubber Manufacturers Assn., 444 Madison Ave., New York 22, for 50 cents.*

Model 247B-214 Dial Indicator Gage for checking wall thickness and outside diameter of beer bottles.



Continuous Measuring Gage checks thickness of hard board sheets . . . automatically marks defective areas.



Federal Dimensionair Air Gage (range .003", magnification 2500 to 1) used in combination with Dial Indicator.

WE MAKE GAGES!

If you think of us solely as the makers of world-famous Federal Dial Indicators, here are a few points to remember.

DO YOU KNOW that for over twenty years Federal has been making complete gages for controlling dimensions? We make mechanical gages, stock gages, special gages, air gages, electronic gages, electrical gages, automatic gages, sorting gages, portable gages, big gages, little gages.

DO YOU KNOW we have over 20,000 gage designs in our engineering files *right now?* Here's one of the greatest storehouses of practical gaging information to be found anywhere.

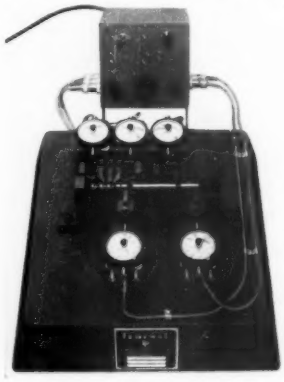
DO YOU KNOW there's undoubtedly a design in our files that's *right* for your job, requiring the barest minimum of adaptation or special design work? Think of the saving this means to you in time, expense, and experimentation.

DO YOU KNOW Federal gages work fast, read easily, and reduce operator fatigue because they're backed by experience? For example, the efficient gage we made yesterday for a manufacturer of automotive equipment helps us design and build an efficient gage for *you* tomorrow — whether you manufacture refrigerators or radios, razor blades, or rivets.

DO YOU KNOW our nationwide gage engineering staff is another big reason why so many leading industries come to Federal for Dimensional Gages? They know they can depend on Federal for service, parts, and know how . . . for on-the-job assistance . . . for help whenever help is needed.

When you have a dimensional control problem, put it up to Federal. For our recommendations, send blueprints indicating dimensions to be checked. No obligation. Also ask for Catalog 61. FEDERAL PRODUCTS CORPORATION, 1127 Eddy Street, Providence 1, Rhode Island.

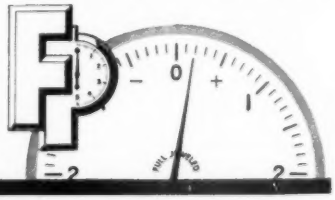
Electronic Gage automatically sorts mica sheets into correct thickness categories.



Electricator Gage for high-speed inspection of many dimensions simultaneously.

FEDERAL

Largest manufacturer devoted exclusively to designing and manufacturing *all types* of DIMENSIONAL INDICATING GAGES



TALKING SHOP

Water

EXTRACT of a speech by some unknown, but immortal, commentator:

"I am asked to speak to you about the toast, 'Water, the purest and best of all things God created.' I want to say to you that I have seen it glisten in tiny teardrops on the sleeping lids of infancy. I have seen it trickle down the blushing dimples of youth, and go in rushing torrents down the wrinkled cheeks of age. I have seen it in sparkling dewdrops on the blades of grass and leaves of trees, flashing like polished diamonds when the morning sun burst in resplendent glory o'er the Eastern hills. I have seen it tumble down the mountainside in cascades fleecy as a bridal veil, with the music liquid silver, filling the vast forest arches with the symphonies sweet and dim. I have seen it in the flowing river rippling over pebbly bottoms, purling about jutting stones, roaring over precipitous falls in its mad rush to mingle with the great Father of Waters, I have seen it go in slow and majestic sweep to join the sea. And I have seen it in the mighty ocean on whose broad bosom float the battle fleets of all nations and the commerce of the world.

"But, Gentlemen, I want to say to you now, as a beverage, it's a damn failure!"

Slanguage

CATERPILLAR admits to a number of nicknames for tractor parts: CHARIOT —protection plate for a radiator oil cooler. SKILLET — throttle control lever. CANARY—squeak in fuel injector. DOG HOUSE—transmission oil guard. HORSE'S NECK — brace for roller frame. PIE PLATE—end cover on final drive. POTATO MASHER—spur gear with integral shaft. All have one reason for being: The part looks like the familiar object from which the nickname is drawn.

Toledo

WHEN Nebuchadnezzar, King of Babylon, took Jerusalem in the sixth century B.C., some inhabitants escaped along the North African coast and across the Straits of Gibraltar to the Iberian Peninsula. They founded a new city there in what is now Spain, calling it "Toledoth," which meant "generations" or "enduring" in ancient Hebrew. This was eventually shortened to "Toledot," then to "Toledo," and the town became famous for a type of steel. When Toledo, Ohio, was formed in 1833, this name was selected. Toledo Scale Company took its name from the city in 1901.

A Dollar A Day

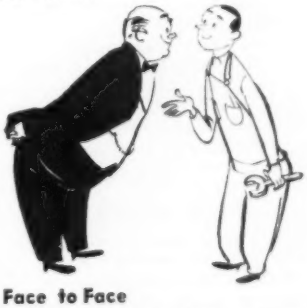
JOHN HANNA, who died in 1916, was the first machinist in the Rumely shops, LaPorte, Ind., and worked there from 1857 until his retirement in 1913, making separators and other farm machinery. Keyways and square holes were first chipped to size by hand, and tools were of the most primitive, but it is John Hanna's day books (kept in German script; he was born an Austrian) that tell the interesting story. Wages were a dollar a day, with each man drawing what he needed of his wages while the company was banker for the rest. Between Aug. 15 and Nov. 28, 1857, John Hanna worked 94 days, but drew only $4 in cash. Christmas month he drew only $13.95. But a year later, he drew $60 on which to return to Vienna for his bride, and all the rest of $290 in his account was given to the church. So, 94 years ago, a dollar now and then took care of necessities; the rest was held against a rainy day while the shopman got food from his garden and his farm.

Air Change

TOOLING for the new pressurized Martin 4-0-4 twin-engined transport is 80% different than its predecessor, the 2-0-2. This reflects major advances in production methods and design, according to production men there. Among other changes, no 75ST is used in tension, and hydraulic and electrical systems are modified to simplify operation, save weight.

Daffynitions

FORTUNE TELLING: woman's intuition on a paying basis . . . MACARTHUR dismissal: Harry-kiri . . . MARRIAGE: eclipse of the son . . . GOSSIP: woman's dirt is never done . . .ANZIO BLONDE: bleach-head . . . BASKETBALL GAMBLERS: hoop snakes . . . SOCIALISM: free false teeth, but no meat . . . WOLF: man who enjoys life, liberty, and the happiness of pursuit . . . BARGAIN SALE: counter-attack . . . CANNIBAL CHIEF: fellow all fed up with people . . . MASSEUR: limberjack . . . MOOSE: animal with horns on one end and a library wall on the other . . . BOXERS: feint-hearted men . . . SWISS WATCHES: money to Berne . . . BACHELORS: parade of the wouldn't soldiers . . . FIREPROOF: boss's son . . . HEAVEN: farewell address . . . HOLLYWOOD RANCH: swimming pool and a flower pot . . . PIN-UP GIRL: baby sitter . . . SMALL TOWN: where station wagons are bigger than the station.



Face to Face

HARVARD SCHOOL of Business Administration studied twelve giant American corporations. They suggest: ". . . there is no substitute for face-to-face contact as a means of insuring adequate communication in an organization. Frequent personal contact among executives, staff men, and supervisors appears to be necessary to guarantee that orders, instructions, information, and expressions of attitude and opinion will in fact be understood.

"We therefore, offer the hypothesis that any administrative unit should be small enough to permit the executive or supervisor in charge of it to engage in frequent face-to-face contact with its members."

News of Metalworking

ASTM Logs Record Meeting

ATLANTIC CITY, N.J.—Registered attendance for the 1951 Annual Meeting (June 18 to 23) of ASTM was 2277, a new high over last year's 2131. Reports were made by 62 technical committees, 57 new specifications and tests were approved, and over 200 existing tentatives and standards were acted upon.

New officers are: Truman S. Fuller, General Electric Co (President); L. C. Beard, Jr., Socony-Vacuum Laboratories (Vice-President); and J. W. Bolton, The Lunkenheimer Co., R. A. Schatzel, Rome Cable Co., E. O. Slater, Smith-Emery Co, Stanton Walker, Nat'l Sand and Gravel Assoc., and F. P. Zimmerli, Associated Spring Corp., (members of the board).

Douglas Hot-Sprays Skins

EL SEGUNDO, Calif.—A 50% reduction in finishing time (27½ hrs) and savings of two gallons of lacquer and eight gallons of thinner per plane are results of a switch to hot-spray lacquering at Douglas Aircraft Co. Process engineers report that sand scuffing is eliminated, and along with it the danger of sanding through the finish over rivet heads and skin laps. The gimmick is that only one coat is needed instead of two.

US Beats UK in Small Shops

LONDON—Small U.S. factories are much more efficient than the average small plant in England. "What has been made possible in America, largely by improvisations without heavy capital expenditures, can be repeated here."

Thus reported the British Productivity Team on the wrought-nonferrous-metals industry, after visiting U.S. plants. The team said further: "Productivity is definitely higher in the U. S. than in the U. K. Certain characteristics are universal throughout the American industry. They are: (1) acceptance of competition; (2) ingenuity; (3) inventiveness; (4) improvisation. Linked with these is the national industrial advertisers' readiness to take risks."

The report has been published under auspices of the Anglo-American Council on Productivity.

Prices of Metalworking Products Frozen At Level Prevailing on June 30

WASHINGTON — Prices of metal goods and machinery have been frozen at the prevailing level on June 30, until Congress enacts new price-control legislation.

This means that companies pricing their goods under the Manufacturers' Order (CPR-22) or Machinery Order (CPR-30) must remain under pricing provisions of the General Ceiling Price Regulation. GCPR provides for a ceiling based on delivered prices in freeze period last Dec. 19-Jan. 25.

Only exception to this rule is in case of companies which had filed new higher prices early enough that the 15-day waiting period had been fulfilled prior to June 30. The new prices would still apply in such cases.

• Manufacturers who filed new higher prices but got them back for revision and had not had time to refile them are out of luck. They are required to use GCPR ceilings.

Rollbacks filed with OPS prior to June 30 stay in effect. There is no waiting before rollbacks apply.

If a manufacturer filed both rollbacks and price increases, without the 15-days' waiting time elapsing, he is allowed to cancel out his rollbacks as well as price increases.

In case a manufacturer had filed increases on several product lines, but got only one back for revision, all increases would go into effect if the waiting period had been fulfilled. The unchallenged increases would apply immediately at the end of the waiting period and the challenged price when it was brought into compliance.

• If a manufacturer offered goods at a new legal ceiling but got no orders under it before June 30, he still can charge the new ceiling, provided he made no sales at the old price during that period.

Some 23,800 manufacturers had filed prices with OPS up through July 1, under CPR-22 and CPR-30. An early check-up showed that price schedules were about evenly divided between those calling for higher prices and those specifying rollbacks.

A new OPS regulation, known as GOP 15, covering machine-tool builders, became effective on July 16. Details are given on page 111.

Munitions-Board Shakeup Produces Revised Powers

WASHINGTON, D. C.—The three services have been asked by Defense Secretary Lovett to replace procurement undersecretaries Alexander (Army), Koehler (Navy), and Zuckert (Air Force). Based on President Truman's April 27 meeting of cabinet officers and top officials, in which the President called for less vascillating and more planning, Lovett has given the board new functions that put teeth into their scheduling.

As revised, the board will continue to pull together procurement needs of the armed forces, but now has power—through cooperation with Assistant Secretary of Defense (Budget) McNeil—to force compliance by recommending the withholding of procurement funds where desirable.

New powers include: Check on production schedules for ¾ of hard goods produced for the services; Check on scheduling of semi-direct military items to reduce stockpiling where it's needless; Check on duplication ordering and hoarding of military items; Authority to transfer surplus goods from service to service; Authority to allocate scarce machine tools among services and to straighten out bottlenecks.

The tie-in with McNeil's office gives the board the power the services respect most—a string on the money belt.

South Is Big Metal Area

ATLANTA, Ga.—Starting compilation of an industrial directory of the Southern states, the Southern Association of Science and Industry estimated that the area includes over 2500 plants worth $1 million or more; and of these, 252 are in Metalworking, and 212 in machinery and equipment. The directory will include company, product, and geographical indexes.

Wilson Issues Directive to Help Break Machine Tool Bottleneck

WASHINGTON—A directive to help "break the bottleneck" in machine tools has been issued by Defense Mobilizer Charles E. Wilson. It calls for:

(1) Modification of price controls —more equitable treatment to the industry, which has been hard hit since the end of World War II.

(2) Procurement of adequate facilities, materials and components—encouragement of subcontracting in areas where slackened civilian production has caused labor layoffs, and utilization of used and idle machines.

(3) Easier financing — advance payment of 30% on pool contracts.

(4) Pooling of orders and encouragement of subcontracting. Amount of money for pool orders to be increased.

(5) Overcoming manpower shortages. Adequate manpower will be assured machine-tool builders by ODM manpower policies.

Mr. Wilson pointed out that the Munitions Board estimates that $2.9 billion of machine tools will be required for defense tooling by the end of June, 1952. But the industry currently is running only at an annual rate of $675 million.

The directive was sent to these agencies: DPA, NPA, ESA, GSA, Defense Department, Atomic Energy Commission.

Italian Fair Shows New Tools

MILAN, Italy—Italy's rapidly expanding machine-tool industry clearly showed its design and productive ability at the recent Milan Fair.

Virtually every type of standard machine tool was exhibited. Many were admittedly copied from American and Swiss prototypes, but there was considerable evidence of original Italian thought. Export models of this equipment are optionally calibrated to American standards.

An automatic machine for thread-cutting wood screws was offered by Vititalia, Milan. The cutter arrangement permits an even load distribution, decreasing substantially the number of cuts required. The feed can be changed without changing the cam, and the machine will handle all commercial sizes from 1/16 to 9/32 in. dia, and up to 4 in. long.

V. Russo, Milan, showed an unusual centerless grinder, for both straight and taper grinding. Using only 9 sq ft of floor space, the machine will take work to a 3-in. maximum dia.

CHICAGO—From refrigerators to jet-engine parts—New million-sq-ft factory of Hotpoint, Inc., will produce Turbo-Wasp components, with pilot runs scheduled this fall. Shown studying plant layout are: (left to right) G. W. Leserman, plant superintendent, Hotpoint; F. J. Walters, vice president, Hotpoint; L. C. Mallet, assistant general manager; and E. E. Champion, purchasing agent, both of Pratt & Whitney Aircraft Co.; E. E. McEwan, Hotpoint's project coordinator; S. G. Bexson, defense engineering manager, and B. E. Schroeder, vice president-manufacturing, both of Hotpoint; and J. F. Bunce, director of manufacturing, Pratt & Whitney. In 1952, Hotpoint expects 20% of production for defense.

Plant-Expansion News

Northrup Aircraft, Inc., plans to construct a branch factory on a 33-acre site at Anaheim, Calif. The 250,000-sq-ft building will be used for the production of optical range finders for the Army's Ordnance Corps. Operations will be entirely separate from the aircraft division at Hawthorne, Calif.

General Electric Co. will soon break ground for the construction of its proposed Appliance Park on a 700-acre tract of land at Buechel, Ky. Ultimately, the multi-million-dollar park will be the manufacturing, engineering, marketing, and administrative center for all of GE's major appliance operations.

The Wel-Met Co., Kent, Ohio, is planning the construction of an additional manufacturing plant at Salem, Ind. Costing over $1½ million, exclusive of land and building, the factory will facilitate production of specialty parts made of sintered metal powder.

Miller Motor Co., Chicago, has completed construction of a 50,000-sq-ft manufacturing plant at nearby Melrose Park, Ill. The one-story factory will produce air and hydraulic cylinders, and represents the latest in plant design engineering.

Ford Motor Co.'s Plant & Equipment Mfg. Division has purchased 3½-acres of land adjacent to its main plant at Ypsilanti, Mich., as a site for an aircraft-accessories plant. Combining administration and manufacturing facilities, the buildings will cover 400,000 sq ft.

Gerity-Michigan Corp. will construct new facilities for the hard-chrome plating of army gun tubes at Adrian, Mich. Covering over 20,000 sq ft, the one-story building will be 45 ft high to accommodate the cannon tubes, with a 35-ft-deep pit for plating.

Wheeling Steel Corp. will invest $24 million in a construction and improvement program to boost steel production.

Willys-Overland Motors, Inc., has acquired a plant in Toledo, Ohio, to house its newly-created Electronics Division. Occupied last month, the plant will be used for development work in the electro-mechanical field.

STATUS OF PLANTS IN THE NATIONAL RESERVES

TYPE OF PLANT	TOTAL			IN PRODUCTION			
	ALL PLANTS	DEPARTMENTAL RESERVE	NATIONAL RESERVE	ON MOBILIZATION & SIMILAR PRODUCTS	ON OTHER PRODUCTS	BEING REACTIVATED	IDLE
Aluminum	17	0	17	13	0	2	2
Copper	1	0	1	1	0	0	0
Ferro-Alloys	5	0	5	4	0	1	0
Magnesium	12	0	12	3	0	8	1
*Other alloys	7	0	7	6	0	0	1
TOTAL, RAW MTLS.	42	0	42	27	0	11	4
Aircraft	67	36	31	45	5	15	2
Explosive & Amunition Loading	51	38	13	18	0	14	19
Guns and Amunition	54	43	11	32	5	9	8
Iron and Steel	48	22	26	41	0	4	3
Chemicals	26	15	11	12	5	3	6
Machinery & Electrical Equip.	31	20	11	26	3	2	0
Tank—Automotive	11	2	9	7	1	3	0
Shipbuilding	77	60	17	58	2	0	17
Miscellaneous	14	7	7	9	4	1	0
TOTAL, END PRODUCTS AND PARTS	379	243	136	248	25	51	55
TOTAL ALL MFG.	421	243	178	275	25	62	59
Research	17	17	0	—	—	—	—
Other Development Projects	4	0	4	—	—	—	—
TOTAL, ALL TYPES	442	260	182	—	—	—	—

* Includes 1 tin, 2 carbon, 2 graphite, and 2 zinc plants.

Reserve Plants Speed-Up Expanding Defense Output

WASHINGTON—Some 80% of the nation's 442 reserve war plants are back in use or are being readied for defense production. They are providing a speedy means for expanding output at a time when it would have taken critical materials and many months to build new plants from scratch.

Reserve plants fall into two classifications:

(1) Departmental industrial reserve, comprised of plants assigned directly to the Army, Navy or Air Force. They are in addition to arsenals, shipyards and other permanent plants of the Services.

(2) National industrial plant reserve, which includes plants that could be used for civilian production in peacetime without hurting their wartime potential. Many were offered for sale or lease to private firms under specific agreement that they would be kept ready for prompt conversion to war production when and if required. Plants in this group not sold or leased remain in custody of General Services Administration, which is caretaker of government property.

Of 260 plants in the departmental reserve, 243 are manufacturing plants. Remaining 17 are research, test and development facilities. Shipyards, arsenals, ammunition depots and aircraft factories, which form a major part of this group, have increased steadily in activity the past year. All but 12% are in use or being reactivated.

Of 182 plants in the national industrial reserve, 42 are basic raw materials plants, 136 are manufacturing plants. Some 113 of the 136 manufacturing plants are in production or are being readied.

The table shows the status of reserve plants as of May 1, 1951.

Machinery Directory Brought up to date

A revision of "The Directory of Metalworking Machinery" is scheduled for distribution around Aug. 1. This second revision of the directory reflects changes in corporate structure and plant ownership and includes new manufacturers of metalworking machinery along with models of machines produced since the 1947 revision.

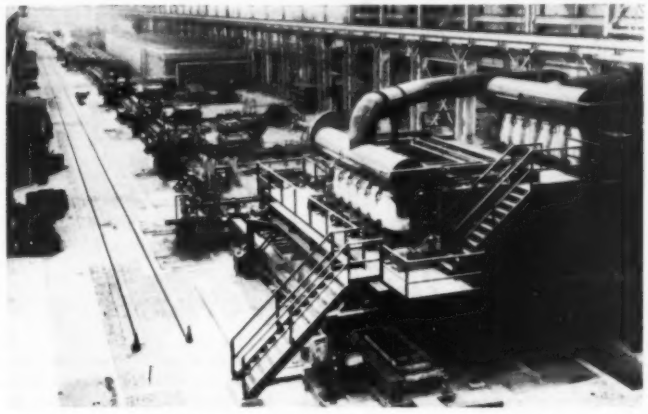
The directory provides a master reference index to approximately 800 machine tool builders and their products. The listing includes approximately 60,000 metalworking machines with data indicating descriptions, sizes and capacities, manufacturers' model numbers, standard commodity classification code, code for manufacturers' model numbers, and the code for manufacturers' names.

The directory was revised by the cataloging agency of The Munitions Board of The Department of Defense. It classifies metalworking machines for the military and other government agencies for procurement, inventory, and management purposes.

Sale price of the directory will be $3.50 a copy in a paperbound edition. Copies may be obtained from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.

Alan Wood Steel Celebrates 125th Anniversary

CONSHOHOKEN, Pa. — The Alan Wood Steel Co. is celebrating its 125th anniversary this month. Family-run for seven generations, the company has grown to a variety of manufacturing operations and has its own iron ore mine in New Jersey. Mainly a maker of specialty products, it has produced since 1949, a stainless clad steel and more recently, a non-skid abrasive floor plate. Its payroll in 1950 was $12.5 million. It has spent $21 million the past five years in plant additions and improvements.



Principal recent addition to Alan Wood Steel Co. is this $9 million, 30-in. hot-rolled strip mill. First of its kind in eastern Pennsylvania, it has been operating all of this year

CERTIFICATES OF NECESSITY GRANTED FOR DEFENSE PLANT EXPANSION

WASHINGTON — Certificates of necessity for accelerated tax amortization of new or expanded defense facilities were recently approved by the Defense Production Authority for the following concerns:

Name of Company & Location of Facilities	Amount Eligible	% Certified
Henry Bros. Tool & Die Works, Phila.	$ 6,216	90
Frisby Machine Co., Inc. Freeport, N.Y.	59,475	80
Hackensack Cable Corp. Hackensack, N.J.	264,223	75
National Electric Machine Shops, Inc. Silver Springs, Md.	158,364	80
The Imperial Brass Mfg. Co. Chicago	56,198	75
Farr Co. El Segundo, Calif.	197,575	75
Turner Piston Co. Bell, Calif.	26,725	75
Packard Motor Car Co. Detroit, Mich.	15,244,800	75
Clark-Aiken Co. Lee, Mass.	83,500	90
El Paso Associates Colorado Springs, Colo.	30,000	75
General Metals Corp. Huntington, W. Va.	5,624	75
Auburn Spark Plug Co., Inc. Auburn, N.Y.	49,807	90
Anderson, Inc. Chicago	17,987	90
Avco Mfg. Corp., Lycoming-Spencer Div. Williamsport, Pa.	286, 430	75
Oilgear Co. Milwaukee	1,100,363	80
Acme Electric Corp. Allegeny, New York	165,427	75
Cleveland Hobbing Machine Co. Euclid, Ohio	58,559	85
Supreme Knitting Machine Co., Inc. Ozone Park, N.Y.	392,177	75
Sundstrand Machine Tool Co. Rockford, Ill.	45,872	75
Chicago Forging & Mfg. Co. Chicago	130,232	85
Wm. I. Whittaker Co., Ltd. Los Angeles	112,642	85
General Steel Castings Corp. Granite City, Ill.	698,995	75
New Hampshire Ball Bearings, Inc. Peterborough, N.H.	520,760	80
Raybestos-Manhattan, Inc. Crawfordsville, Ind.	1,757,676	70
Avildsen Tools & Machines, Inc. New York	291,000	85
American Drill Bushing Co., Inc. Los Angeles	56,292	80
Acromatic Tool Co. Oak Park, Mich.	52,338	90
Pyle-National Co. Chicago	709,050	80
Titan Metal Mfg. Co. Bellefonte, Pa.	720,106	60
The Budd Co. Phila.	5,300,000	75
L. I. Machine & Pattern Works, Inc., Brooklyn, New York	26,686	90
Hammond Iron Works Bristol, Pa.	519,404	60
Elgin National Watch Co. Elgin, Ill.	60,812	75
Clifford Mfg. Co. Waltham, Mass.	30,000	75
Driver-Harris Co. Harrison, N.J.	759,051	70
Steel Products Engr. Co. Springfield, Ohio	1,714,052	75
Willard Machine Co. Buffalo, N.Y.	28,809	90
Foote Bros. Gear & Machine Corp. Chicago	15,795	85
Brainard Steel Co. Warren, Ohio	2,531,389	60
Precision Piece Parts, Inc. Mishawaka, Ind.	31,670	90
McGill Manufacturing Co., Inc. Valparaiso, Ind.	514,600	75
Halldon Machine Co. Thomaston, Conn.	474,596	60
Texas Foundries, Inc. Lufkin, Texas	171,778	75
Glenn L. Martin Co. Baltimore, Md.	176,043	80
Kelsey-Hayes Wheel Co. Detroit	40,650	90
Cogsdill Twist Drill Co. Detroit	76,062	75
Pittsburgh Forgings Co. Coraopolis, Pa.	99,955	75
Lockhead Aircraft Corp. Burbank, Calif.	1,077,745	80
Locomotive Finished Material Co. Atchison, Kan.	182,130	75
Automotive Materials Corp. Plymouth, Mich.	141,300	60
Detroit Stamping Co. Detroit, Mich.	66,324	75
Crawford Steel Foundry Co. Bucyrus, Ohio	22,016	75
Magnetic Metals Co. Camden, New Jersey	566,205	75
Russell, Burdsall & Ward Bolt & Nut Co. Portchester, N.Y.	95,000	75
Stewart-Warner Corp. Indianapolis	103,562	85
Baltimore Steel Co. Baltimore, Md.	221,462	80
Blaw-Knox Co. Groveton, Pa.	240,000	75
C. S. Walker Co., Inc. Worcester, Mass.	113,267	85
M. W. Kellogg Co. Jersey City, N.J.	71,782	85
North American Aviation, Inc. Los Angeles	6,508,495	75
Altens Foundry and Machine Works, Inc. Lancaster, Ohio	173,150	75
Standard Steel Treating Co. Detroit	31,754	80
Becton, Dickinson & Co. Rutherford, N.J.	1,763,500	75
Standard Foundry Co. Worcester, Mass.	498,510	75

I. Melville Stein

E. P. Cunningham

E. J. Baumrucker

R. J. S. Pigott

Names in the News

I. Melville Stein has been elected executive vice president, Leeds & Northrup Co., Philadelphia. Mr. Stein has been with the firm since 1919, and has been vice president in charge of research since 1944.

Arthur J. Williamson has been appointed vice president in charge of manufacturing operations, Tube Reducing Co., Wallington, N. J. He was formerly associated with Sumerill Tubing Co. as plant manager at Carnegie, Pa.

A. E. McRae has been appointed superintendent of the Gun Plant, Oldsmobile Div., GMC, Lansing, Mich. He was formerly superintendent of Olds, pressed-metal and plating plant and in that position is succeeded by **Robert T. Rollis.**

Ralph W. Rausch has been appointed consulting engineer, Link-Belt Co., Chicago. He has been with the company since 1925. **Joseph J. Richard** succeeds Mr. Rausch as chief engineer, Pershing Road plant.

Harvey E. Witwer has been appointed general factory superintendent, Geuder, Paeschke & Frey Co., Milwaukee, Wis. He was previously manager of the planning department of the firm.

Frank L. Munsey has been appointed assistant plant manager of the Sandusky, Ohio plant, New Departure Div., GMC. **Raoul L. Larue** succeeds Mr. Munsey as factory manager at the Sandusky plant.

Michael Dufal, purchasing agent and production manager, Universal Lubricating Systems, Inc., Oakmont, Pa., has been elected a vice president of the company.

Eugene P. Cunningham has been appointed sales manager of the Clearing Machine Corp., Chicago. **Ervin J. Baumrucker** was named assistant sales manager of the firm.

George V. Luerssen has been elected vice president in charge of metallurgy, Carpenter Steel Co., Reading, Pa. He succeeds **B. H. DeLong,** retired. **Dr. Carl B. Post** was named chief metallurgist of the firm and **George E. Brumbach** was advanced to the position of metallurgist.

S. J. Merriman has been appointed assistant to the general manager, E. Pittsburgh Div., Westinghouse Electric Corp. He has been associated with the company since 1933.

S. D. Flinn has been appointed comptroller, U. S. Steel Supply Co., a U. S. Steel Corp. subsidiary. He succeeds **F. L. Warnke** who joins the parent company in Pittsburgh.

Herbert B. Link has been named president, The Bellows Co., Akron, Ohio. Mr. Link has been executive vice president of the company since 1939. He succeeds **L. F. R. Bellows,** deceased. **L. F. R. Bellows, Jr.,** was named vice president and **Byron D. Kuth,** secretary-treasurer.

Nicholas Kay has been named manager of the production department, Metal Products Div., Koppers Co., Inc., Baltimore, Md. Mr. Kay has been with the Metal Products Division since 1940 and was formerly manager of the piston-ring plant. **Therman S. Naylor** has been appointed manager of the division's contracting department. Mr. Naylor has been with Koppers since 1942.

Reginald J. S. Pigott, director of the engineering division, Gulf Research & Development Co., Gulf Oil Corp., has been nominated for president, 1952, American Society of Mechanical Engineers. Nominations for regional vice presidents of the society include: **Willis F. Thompson,** chief engineer, Westcott & Mapes, Inc., New Haven, Conn.; **Ernest H. Hanhart,** consulting engineer, Baltimore, Md.; **Ernest S. Theiss,** assistant chief engineer, Davey Compressor Co., Kent, Ohio; **Samuel H. Graf** (renomination), director, Engineering Experimental Station, Oregon State College, Corvallis, Ore.

W. B. Caldwell has been elected president, Calumet Steel Division, Chicago Heights, Ill., and the Franklin Steel Division, Franklin, Pa., of the Borg-Warner Corp. Mr. Caldwell previously was vice president and general manager of both divisions.

Eugene M. Lang has been elected vice president in charge of manufacturing, Heli-Coil Corp., Long Island City, N. Y. He was formerly works manager of the plant and in that position will be succeeded by **Louis K. Rimer,** previously vice president-operations, Elgin American Co., Elgin, Ill.

Byron A. Fay has been elected vice chairman of the board, Electric Auto-Lite Co., Toledo, Ohio. Mr. Fay is a director of the company and vice president in charge of manufacturing. **H. E. Hasemeyer,** vice president, has been named executive vice president of the firm and **Joseph H. Lambrix** has been elected vice president and director of purchases.

Lawrence L. Garber has been elected vice president, H. K. Porter Co., Inc., Pittsburgh, Pa. He is general manager, American-Fort Pitt Spring Division of the company.

J. A. Baldinger

J. P. Stewart

C. A. Jurgensen

S. D. Baumer

John A. Baldinger has been named general manager, Automatic Transportation Co., Chicago, a division of Yale & Towne Mfg. Co. Mr. Baldinger has been associated with the firm since 1945 and was previously assistant general manager of the Philadelphia division.

E. W. Ristau has been appointed general manager, Ohlen-Bishop Mfg. Co., Columbus, Ohio, a subsidiary of Rockwell Mfg. Mr. Ristau is a former vice president of Skillsaw, Inc. and Cummins-Chicago Corp.

F. T. Sagemiller has been named assistant production control manager, Allis-Chalmers general machinery division, West Allis, Wisc. He succeeds **F. C. Butler,** retired.

John D. Gordon has been appointed general sales manager, Mechanical Handling Systems, Inc., Detroit. He was formerly vice president and general manager, Progressive Welder Co.

Robert Paxton has been elected an executive vice president, General Electric Corp., Schenectady, N. Y. Mr. Paxton, formerly vice president of manufacturing policy, succeeds **Hardage L. Andrews,** who has retired after 41 years association with the company. Other G-E executive changes include: **Raymond C. Freeman,** named manager, Welding Div., Fitchburg, Mass.; **A. T. Chandonnet,** appointed manager, Turbine Div., Lynn, Mass.; **John T. Holleran,** appointed manager, Allied Products Div., Ft. Edward, N. Y.; **H. L. Disco,** appointed manager, Jet Engine Parts Div., Major Appliance Dept., Bridgeport, Conn.; **W. B. Booth,** named manager, Ordnance Operation, Pittsfield, Mass., and **D. R. Shoults,** appointed director of G-E's Aircraft Nuclear Propulsion project at Lockland, Ohio.

James P. Stewart has been elected president, De Laval Steam Turbine Co., Trenton, N. J. Mr. Stewart was formerly executive vice president of the company. Other De Laval executive promotions include: **Wencel A. Neumann, Jr.,** named vice president of industrial sales, **H. G. Bauer,** elected vice president of engineering, and **Charles A. Jurgensen,** works manager, was elected vice president of manufacturing.

Martin J. Holleran has been named assistant manager of tool steel sales, Carpenter Steel Co., Reading, Pa. He has been with the company since 1946 and was previously sales engineer, New York territory.

Merle A. Miller has been elected a director and member of the executive committee, Joseph T. Reyerson & Son, Inc., Chicago. Mr. Miller has been with the firm since 1922 and in 1946 was elected company treasurer.

Dr. Clarence Zener has been appointed an associate director of research Westinghouse Electric Corp., Pittsburgh. He was previously on the staff of the Institute of Metals, University of Chicago.

Leon J. Dunn, assistant to the executive vice president, Veeder-Root, Inc., Hartford, Conn., has been elected president of the Society for Advancement of Management for 1951-52.

Clinton B. Burnett has been appointed director of engineering, Johns-Manville Corp., New York. He has been with the company since 1931 and is vice president of Johns-Manville Products Corp.

Paul F. Dorn has been elected vice president, Utica Drop Forge & Tool Corp., Utica, N. Y. He is director of personnel for the company.

S. D. Baumer has been appointed vice president of the Airco Equipment Manufacturing Div., Air Reduction Co., Inc., New York. He has been with company's general technical sales department since 1941 and manager of the department since 1948.

S. F. Walton and **D. M. Ramsey** have been elected vice presidents of Exolon Co., Tonawanda, N. Y. Mr. Walton is technical director, and Mr. Ramsey is works manager of the Tonawanda plant. **Earl L. Hauman** continues as vice president and general manager.

James F. Jones has been named factory manager, Hudson Motor Car Co., Detroit. He has been with the firm since 1942.

OBITUARIES

John M. Hopwood, 67, chairman of the board, Hagen Corp., Pittsburgh, died June 8. He was also head and co-founder of Hall Laboratories, Inc., Calgon, Inc., and Burmion Co.

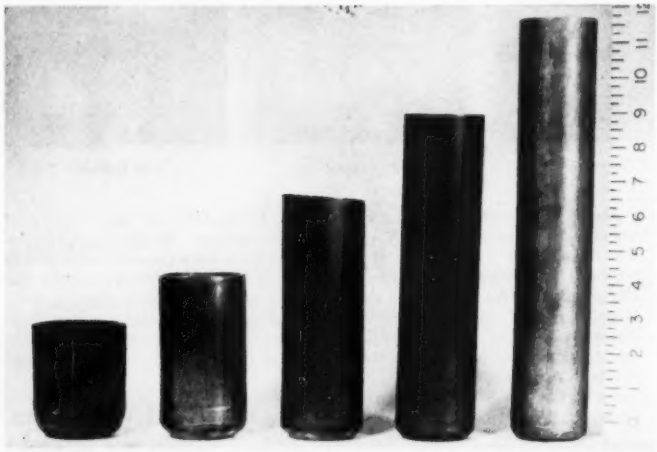
J. Gordon Gage, 64, chairman of the Butler division of Armco Steel Corp., died June 30 while playing golf at Cambridge Springs, Pa.

George F. Smith, 86, sales representative for Heller Brothers Co., died on May 23 in Baltimore. He was placed on the "Roll of Honor" of the Southern Hardware Jobbers Assoc.

Robert Levison, 47, of Bauer Machinery Co.'s sales staff, died June 28, after serving the machinery business for 17 years.

Julian Deane of the Hampden Grinding Wheel Co., Springfield, Mass., died July 6 after serving the company for 55 years.

New Shop Equipment



CUP	1st DRAW	2nd DRAW	3rd DRAW	4th DRAW
Reduction:				
MOUTH	38.8%	33.9%	25.9%	25.6%
BASE	31.2%	27.8%	23.4%	28.9%

Deep drawing a hollow steel member. Over-all reduction is 80%, and the four draws were accomplished without intermediate anneals and with only a single application of Foscoat

Forward cold extrusion in a single press operation. Reduction in cross-sectional area is about 85%, but this is not the ultimate limit

Phosphate Coat Speeds Cold Working of Steel

The Foscoat metal-treating method consists of a compatible cleaning, pickling, and phosphate coating procedure combined with a specially developed lubricant. The surface produced is chemically interlocked with the steel, and can not be removed, even under the most severe drawing operations.

For example, wire drawn after Foscoating can be fed to a cold header without further lubrication, and header die life will be materially improved. In wet drawing, production increases up to 40% have been achieved, with die life increased 2½ times. A single application permits dry drawing square and other shapes from round wire without intermediate anneals and recoating.

One of its most important applications is in cold extrusion, for which it was originally developed through the joint efforts of Pennsalt and Heintz Mfg. Co. The preliminary work done in this field forms the basis for cold-extrusion developments in the U.S., but further advances await the general availability of press equipment of sufficient size to take advantage of the greatly increased lubrication limits.

Extraordinary results are already being achieved in deep drawing and stamping. The limitation normally imposed by lubrication has been virtually overcome, and ductility of the metal itself is now the one remaining limiting factor. In deep-drawing steel cartridge cases, 80% reduction of wall thickness has been achieved with a single application of the process without intermediate anneal. Washing-machine-tub output has been increased 140% through reduction of scrap losses and down-time for stoning dies. In tube drawing, 60% improvement is reported.

The complete process consists of pickling and cleaning with compatible Fosclean products, immersing or spraying for a few minutes with Foscoat, and finally soaking briefly with an organic lubricant, known as Foslube. The combined action gives a heat-resistant surface with exceptional adherence.

It has been employed successfully with plain-carbon and SAE alloy steels, but is not intended, at this stage of development, for stainless or high-alloy steels.

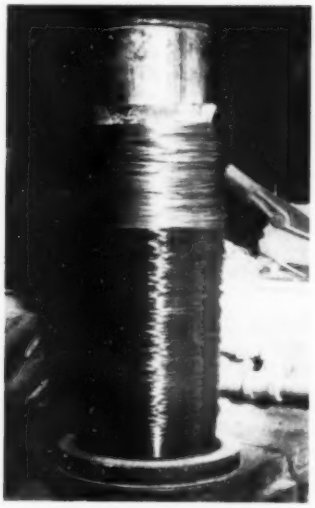
Outstanding economies achieved with this process include elimination of intermediate press operations, annealing and chemical treatment; reduced consumption of chemicals because of compatibility; savings in metal because of reduced scrap loss; and substantial extension of die life.

Pennsylvania Salt Mfg. Co., 1000 Widener Bldg., Philadelphia 7, Pa.

Materials and Parts

Two draws only are required to produce washing machine tubs at Heintz Mfg Co. Production rate has been increased 140% by reduction of rejects and down-time for die stoning

Backward cold extrusion produced from a solid slug in one operation. Reduction is approxiamtely 50% over-all. Alternate method would be to hot-forge a billet twice the starting size, followed by machining



Surface finish produced in wire drawing using Foscoat is evident in the dark-colored, scratch-free lower coil, as compared with the shiny, non-uniform, scratched surface resulting from the use of lime

... INCLUDING

Gear shaver can cut both internal and external gears with pitch diameters up to 100 in. page 176

Ram and table movements are synchronized on a duplex hydraulic broaching machine page 177

Die-casting machines have a plunger speed of 10,000 ipm for magnesium parts page 178

Straightening press (1500-ton) applies pressure to various sections of a forged gun barrel page 180

Tapping machine is powered by three separate motors, permitting operation of one spindle or all three in sequence page 182

Face mill removes cast iron at from 60 to 70 ipm table travel and has only four parts page 182

Die-tryout presses are actuated by simple hydraulic mechanism operated by electric motor or air cylinder page 180

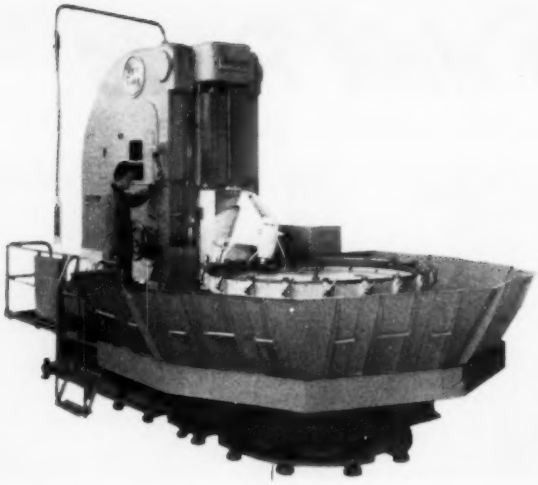
Sheet-feeding table uses scissor-action lift for handling small, compact bundles page 186

Backstand grinding unit does inside-diameter grinding, polishing, and deburring page 190

... and in August 6

Pantograph-tracer machine does accurate milling, routing, and engraving completely around cylinders and rolls

Centers have good wear and abrasion-resistant properties due to a special material that is induction brazed into the shank



Red-Ring 100-in. PD Shaver Can Cut Both Internal and External Gears

Gear-shaving machine is for both internal and external spur and helical gears with face widths up to 40 in. and pitch diameters up to 100 in.—it is said to be the first machine of its kind ever built. It is especially applicable to gears used in tanks, power shovels, mine hoists, large speed reducers, stationary prime movers, and marine drive units.

Shaving is accomplished by the usual rotary crossed-axes principle with the workgear driving the cutter as is customary in shaving gears larger than 24-in. PD.

The general design includes an independently driven rotary work table and a column, which moving horizontally, carries the cutter head to and feeds it into the work. The cutter head reciprocates in its vertical slide across the face of the work.

Rotary Table

The work gear, with its axis vertical, is clamped in a fixture mounted on a large rotary work table. There are no projecting machine elements above the table to interfere with handling heavy gears as they are loaded. Table speed is selective over a wide range by means of change gears.

Column

The column, which carries on its forward end the cutter head assembly, moves horizontally and is supported throughout its full travel by hardened and ground slide ways in the machine base. Approximate bearing pressure on these ways is 15 psi.

It is provided with power rapid traverse in both directions to bring the cutter head approximately into cutting position and to retract it. A safety electric control automatically stops the rapid advance of the column just short of engagement between cutter and workgear. Actual engagement is accomplished by a handwheel which is also used to feed the cutter into the work during shaving.

A direct-reading dial indicator on the column shows the operator the exact amount of each increment of infeed and also when the work has been shaved to specified size.

A single motor drives the column horizontally and the cutter head slide vertically. These movements are controlled through manually operated clutches interlocked so that only one movement at a time can be made under power.

Vertical Cutter-Head Slide

The cutter-head slide is mounted on a rigid tilting mechanism which can be adjusted so that the path of reciprocation is in exact parallel with the workgear axis. This mechanism is also used when it is desired to taper shave the workgear teeth. A dial indicator shows the setup man the exact amount of taper in thousandths per inch of gear-face width.

The cutter-head slide is provided with both power rapid traverse and power feed, both of which are reversible. A convenient lever on the side of the column permits shifting from one to the other. Power feed may be varied over a wide range of speeds by means of change gears. Rapid traverse is constant.

Electrically controlled stops limit the length of stroke, but these controls may be manually released, allowing slide overtravel in order to facilitate withdrawing the cutter from the work.

Cutter Spindle and Head

The cutter spindle is carried on precision anti-friction bearings designed for maximum rigidity and minimum overhang. A vertical adjustment on the cutter head eliminates the need for crossed-axes point spacers and facilitates cutter removal.

The cutter head is adjusted angularly through a total arc of 30° to obtain any necessary crossed-axes setting. The initial adjustment of this setting is made by means of a vernier scale—the final setting by a built-in dial indicator.

Controls

A central pushbutton station and selector switch is conveniently located on the side of the machine, while a duplicate set of controls in a pendant box is suspended from a swinging overarm.

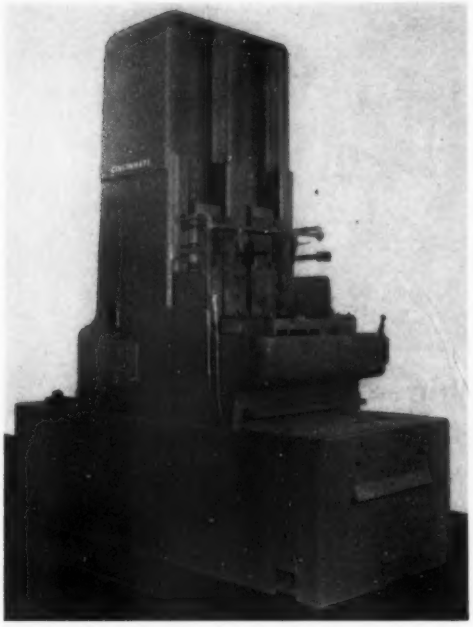
Machine Setup and Cycle

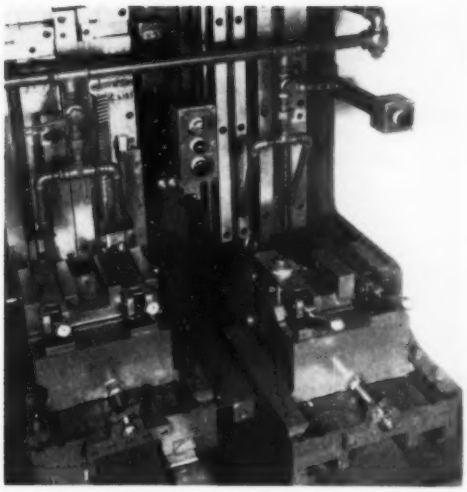
When an internal gear is loaded on the table fixture, the table can be jogged around for clamping the work.

With the work clamped, the column is advanced in rapid traverse until the cutter head is inside the workgear. Then the cutter-head slide is lowered in rapid traverse to the elevation at which the cross-feed stroke is to start. By means of the handwheel, the cutter is meshed with the workgear.

Shaving normally starts with the cutter head on a down stroke. At the bottom of this stroke it stops automatically and a signal light comes on. The operator then presses the upfeed push button and by means of the handwheel also feeds the cutter one increment into the work. On reaching the top of this return stroke the cutter again stops automatically and another signal light comes on indicating to the operator that he can start the next down stroke. These operations are repeated until the gear has been shaved to specified size.

National Broach and Machine Co., 5600 St. Jean Ave., Detroit 13, Mich.





The model No. 5-54 duplex vertical Hydro-Broach tooled up for four operations on detents. Each worktable advances and retracts in conjunction with ram movements

Broaching machine (the Model 10-66) has hydraulically actuated tables and rams, 10-ton broaching force, and 66-in. stroke

Ram & Table Synchronized on Hydro-Broach

The chief advantage offered by the improved Cincinnati duplex vertical Hydro-Broach is in the table construction. The rams move alternately up and down, cutting on the down stroke. In front of each ram, an individual table advances to cutting position and retracts for loading, synchronized with the movement of the rams. These tables operate over long square gibbed bearing ways, hardened and ground, and automatically lubricated.

Like other models in the line the tables and rams are actuated hydraulically. Dovetail clamping strips, located in machined slots, clamp the fixture to the table. The table is extra heavy, and provides ample thickness for drilling and tapping clamping screw holes.

Protection of the hydraulic pump and valves is provided through fine-mesh intake strainers and a filter connected in parallel to the hydraulic circuit. When the pressure on the filter increases to a predetermined value, a pressure gage, visible from the operator's position, serves as an indication that the filter is becoming clogged and should be replaced.

Preset Cycle Control, a safety feature that was formerly supplied as an attachment, is now standard equipment. This unit is a small, shoulder-high electrical pushbutton box extending from the front of the machine. With it, the operator can initiate the starting of the next cycle for either ram if he has unloaded and loaded the corresponding fixture while the ram is returning. If he has not completed this duty, the ram automatically stops at the top of the stroke, and does not descend until the operator elects to touch the preset buttons. Two hands are required; both are out of the way of the cutting tools.

The machines are being built in 5- and 10-ton sizes (broaching force), 42- or 54-in., and 54- or 66-in. stroke, respectively.

Cincinnati Milling Machine Co., Cincinnati 9, Ohio

Trolley Hoist for Use Under Close Headroom

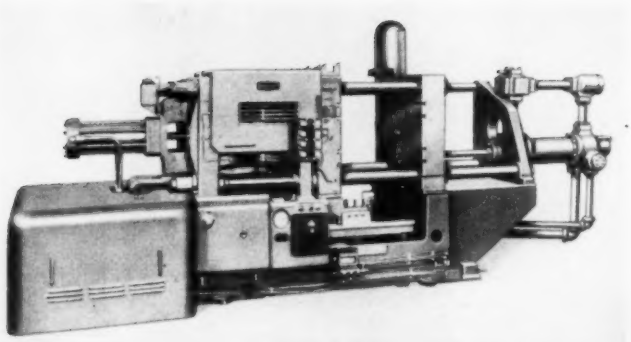
An Army trolley hoist to provide adequate service where a close headroom assembly is required is said to be efficient, lightweight, and able to operate freely around minimum radius curves.

The hoist is made in capacities from ½ to 3 tons and is available with a special load bar in either a pair of two-wheel plain trolleys or one plain and one geared two-wheel.

The plain-trolley assembly has chilled tread wheels equipped with New Departure ball bearings, steel side plate and connections to load bar. Adjustable to a wide range of beam sizes, it is interchangeable with the geared type.

The geared trolley is of the same construction except the wheels are furnished with gear rings having cut teeth, pinions with cut-teeth handwheel, and hand chain with guide.

Wright Hoist Div., American Chain & Cable Co., Inc., York, Pa.



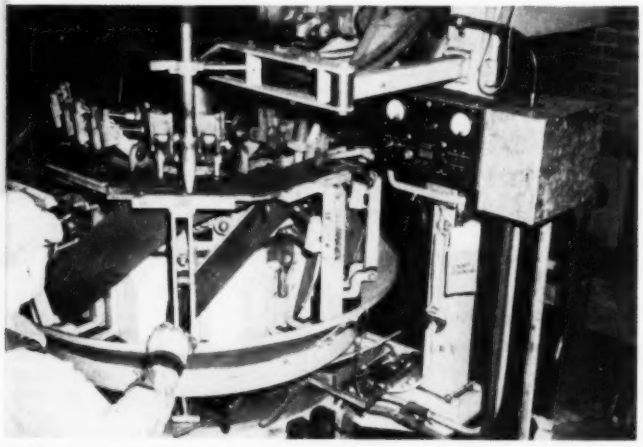
Reed-Prentice Die-Casting Machines Have Plunger Speed of 10,000 ipm

An improved shot plunger on Models 1½G and 2G "Cold Chamber" die-casting machines is reported to give better results for aluminum and magnesium parts.

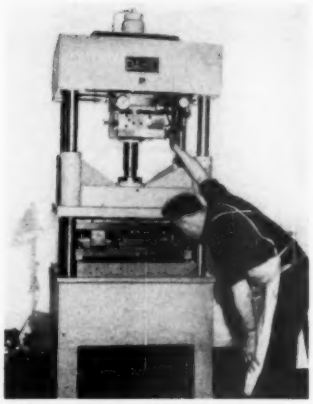
Plunger speed of 10,000 ipm—required especially for magnesium die casting—is attained through a 3-in. two-way valve built integral with the shot cylinder and by using a special prefill. With this arrangement, the plunger moves at low pressure until the mold is filled, at which time maximum pressure is applied instantaneously.

The 1½G machine develops 250-tons die-locking pressure and die casts aluminum parts weighing up to 3.75 lbs, and magnesium parts up to 2.4 lbs. The 2G machine provides 400-tons clamping pressure and has a shot capacity of 9 lbs. aluminum and 6 lbs. magnesium. Both the 1½G and 2G machines have four tie-bars and a sliding support bracket for the movable die plate to maintain proper die alignment under continuous operation. Die plates on the 1½G model measure (VxH) 32x29 in. while the 2G machine has 38x36 in. platens. Die openings are 10¼ and 14 in., respectively.

Dept. A, Reed-Prentice Corp., 677 Cambridge St., Worcester 4, Mass.



ROTARY FIXTURE permits automatic welding of plowshares. The two-piece work, held in place by air clamps on the table, moves under the welding head, which is controlled by an 8-sided cam. With welding action established, a voltage control takes over and automatically governs further operation. Clean, dense welds are made at the rate of 19.1 ipm with up to 65 plowshares produced per hr. The welding current is 500 amp at 35-v ac.—*Union Carbide and Carbon Corp., 30 E. 42nd St., New York 17*



Dake Die-Tryout Presses

Series of hydraulic presses is designed for die matching, short production runs, and for manufacturing samples. The line includes both single- and double-acting models, in capacities from 25 to 125 tons.

All models are actuated by a simple hydraulic mechanism operated by electric motor or air cylinder. The cylinder is designed to attain max. power and speed at 90 or 145 psi.

The single-acting models are powered on the upstroke, and return to starting position by gravity. The double acting are powered on both strokes—and are provided with a rapid-advance mechanism which operates until the press is brought under load. At this point the press automatically changes to power advance until completion of stroke.

Dake Engine Co., Grand Haven, Mich.

Buttons for Transferring Holes In Dies To New Work

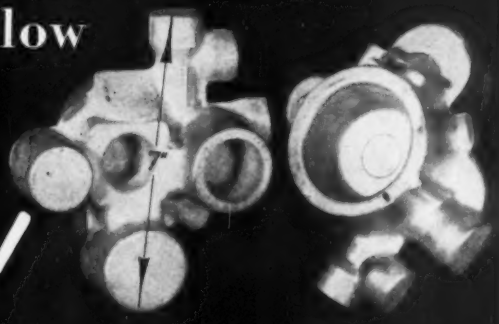
A line of buttons for quickly and accurately transferring spring-pocket holes in dies to new work.

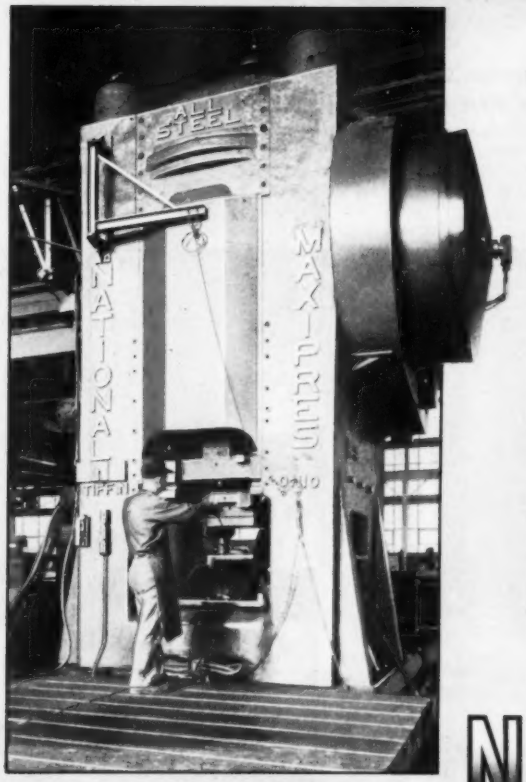
The button is fastened by tightening a socket setscrew which forces a steel ball outward against the wall of the hole. The old die is then placed on the new work and a sharp blow struck. The hardened tool-steel transfer point then records the true center.

The replaceable points are held in the button body by setscrew.

Reid Tool Supply Co., 709 Baker St., Muskegon Heights, Mich.

This Intricate Brass Forging Made in One Blow on a NATIONAL 6A MAXIPRES!





Forging operation at Mueller Brass Co., Port Huron, Michigan

● The Mueller Brass Co., Port Huron, Michigan, makes this difficult brass valve forging in only one blow at a rate of 300 forgings per hour on a National No. 6A MAXIPRES. The original billet measures 3-9/16 inches round by 5-7/16 inches long. (16.6 lbs.)

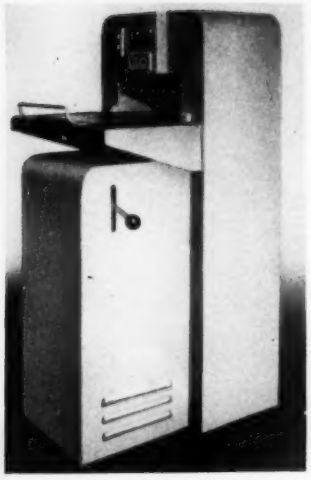
Successful master-forgers of brass and bronze, and pioneers in the development of specialized forging techniques, the Mueller Brass Co. relies upon the dependability of five MAXIPRESSES for a large share of its forging output.

If you have a forging problem—hot or cold, ferrous or non-ferrous—let us help you with it. Send us prints or a sample of the part you wish to forge. Better yet, visit us. No obligation.

NATIONAL
MACHINERY COMPANY
TIFFIN, OHIO.

DESIGNERS AND BUILDERS OF MODERN FORGING MACHINES—MAXIPRESSES—COLD HEADERS—AND BOLT, NUT, RIVET, AND WIRE NAIL MACHINERY

Hartford Detroit Chicago

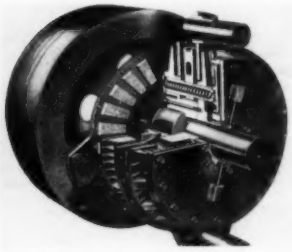


Sepore Hydraulic Molding Press

The Model No. 7 press is especially designed for the production of molded printing plates. It features application of hydraulic pressure over the entire area of the moving platen. This establishes uniform pressure over the area of the printing plates.

Other features include long gibs and a heavy steel frame, with all parts except the platen enclosed. Provision is made for air cooling; thereby eliminating the need for sheet packing as heat insulation. Other features can be incorporated for adapting it to other classes of work. The presses are manufactured by the Vulcan Iron Works, Wilkes-Barre, Pa.

Sepore Corp., 342 Madison Ave., New York, N. Y.



Bliss Air Friction Clutch Adjusts for Wear Automatically

Several major advantages are claimed for this clutch, including:

Speed: The clutch and brake are arranged such that the driving disk need move only a fraction of an inch between full engagement and braking.

Cool Running: Self-induced ventilation assures rapid heat dissipation. The friction plates are arranged to assist centrifugal blower action, blowing a strong current of cooling air directly on the surfaces where the heat is generated. Cycle-welding of linings to plates aids rapid heat transfer.

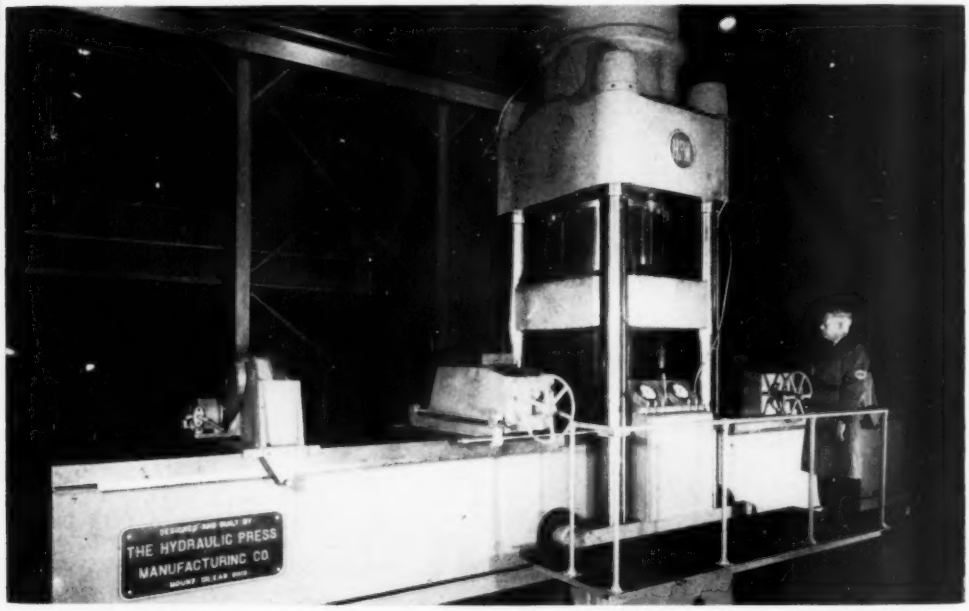
Adjustment-Free: Plates are arranged to compensate for wear automatically. Difference in plate travel between new friction plates and worn-out plates is less than half an inch.

Quick Replacement of Plates: Friction linings for both clutch and brake are mounted on removeable insert plates which can be replaced without disassembling the clutch.

Clutch and brake act as a single unit, preventing overlapping engagement. The brake automatically sets if power or air pressure fail.

The clutch, identified as Type K, is made in several sizes and is being installed in most medium and large sizes of Bliss mechanical presses. A modified design, suited to installation on older type Bliss presses in the field, is also available.

E. W. Bliss Co., Canton, Ohio

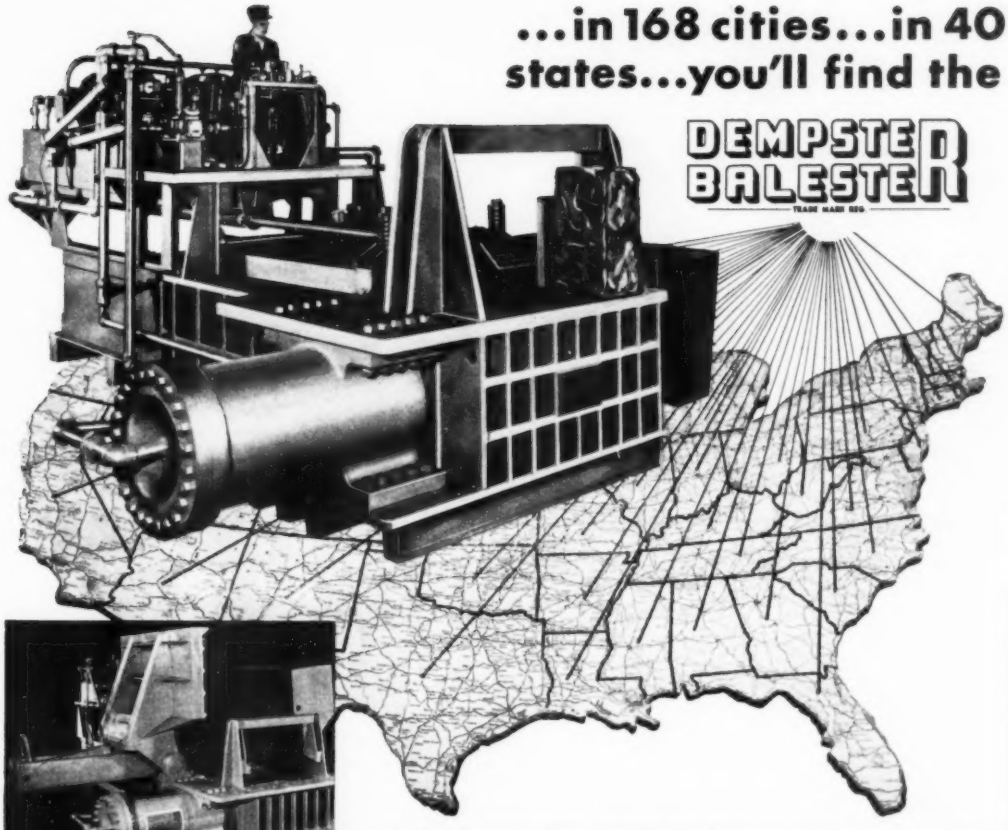


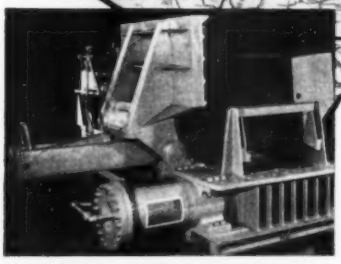
STRAIGHTENING PRESS of 1500-ton capacity applies pressure to various sections of a forged gun barrel. The entire cylinder and ram assembly traverses horizontally along the bed a maximum distance of 204 in. Hydraulic system allows the press to operate at high-speed cycles—with rapid advance to the work, automatic slow-down while pressure is applied, and rapid return for the next cycle. *— The Hydraulic Press Mfg. Co., Mt. Gilead, Ohio*

...in 168 cities...in 40 states...you'll find the

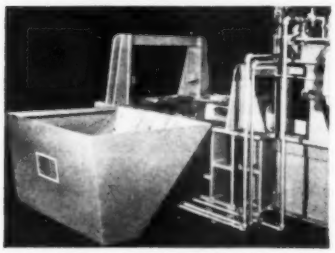
DEMPSTER BALESTER

TRADE MARK REG.





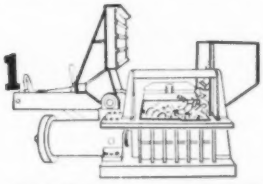
Skip-Pan Loader in unloading position with Auxiliary Compression Door ready for compression stroke.

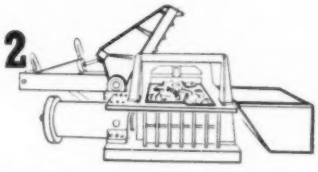


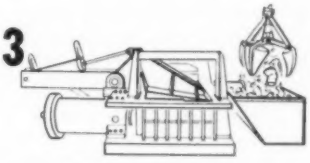
Skip-Pan Loader in re-loading position, while Auxiliary Door compresses scrap.

The first Dempster Scrap Metal Baling Press was manufactured only 10 years ago. Today you'll find them throughout the nation. . . in 168 cities. . . doing a production job that only the "Balester" can do for efficiency and low cost. Here is the "600" that turns out bales at an approximate rate of 6 to 7½ tons per hour. With Auxiliary Compression Door, it is the nearest thing available to "Automatic" baling. Every phase in the baling cycle is operated by hydraulic controls.

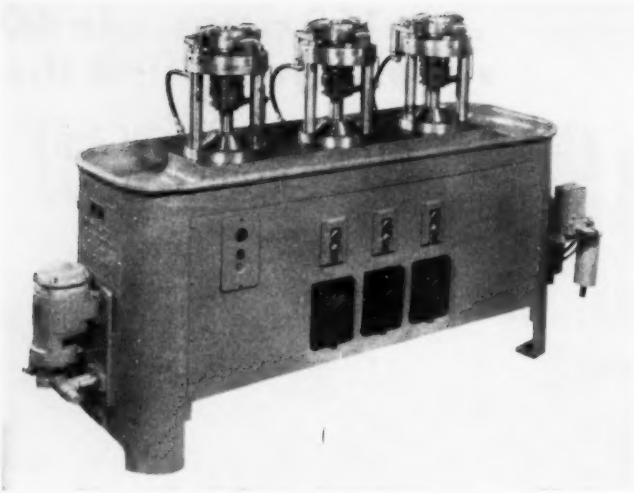
Shown below is the 1-2-3 production punch with Skip-Pan Loader and Auxiliary Compression Door. 1. Skip-Pan dumps metal into charging box. 2. Door begins stroke and Skip-Pan returns to loading position. 3. Door compresses scrap with a 45-ton force while Skip-Pan is re-loaded. The Auxiliary Compression Door completely eliminates in most operations, and materially reduces in others, the cost of tying up two or three extra arrangers. The Dempster-Balester is built in four models, with capacities from 2 to 7½ tons per hour. If you are interested in baling scrap metal, see a Dempster-Balester in operation near you. Write for nearest installation. A product of Dempster Brothers, Inc.







DEMPSTER BROTHERS, 471 Dempster Building, Knoxville 17, Tennessee



Prutton Tapping Machines Powered by Three Separate Motors

This tapping machine is designed for production threading on tubing, shells, and for all threads in a range of from 4- to 11-in. pitch.

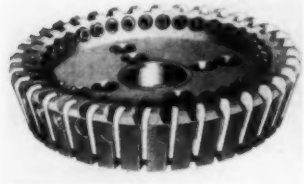
Known as the Model 40A, it is powered by three separate 3-hp motors permitting the operation of one spindle or all three in sequence.

Fixtures are operated by air and controlled by limit switch. The old leadscrew has been replaced by a master cam to permit the use of collapsible taps. The tap, fed by the cam, rises to the fixture-held work. Correct speed is prearranged on a combination pulley attached to each drive. When threading is completed, the tap collapses and the master cam is in position to adjust feed for facing and chamfering. The cam continues to clear the head from the fork and reset for the next cycle, thus the need for tap reverse travel is eliminated.

Lubricant in the reservoir is pressure fed through separate lines for each head. A ring in the tapping fixture with 4 perforations directs flow at an angle to four sides of the tap. Flow starts before thread-cutting and is continuous throughout the cycle.

Floor space required is 72x24 in. and height is 4 ft. over-all.

D. H. Prutton Machinery Co., Cleveland, Ohio



Kennametal Face Mill Removes Cast Iron at 70 ipm

Axial face mill, the Style MF Kennamill, has wedged-in solid Kennametal blades and structural features that make possible removal of cast iron at from 60 to 70 ipm table travel. It is suitable for both general-purpose and continuous-production milling.

This mill has only four parts: Body, blades, wedges, and nuts. Wedges and screws are one-piece high-alloy steel, hardened and ground to close tolerances. They remain assembled to the cutter body at all times, thus reducing the possibility of lost parts.

The blades, which are the same as those used in previous design of cast-iron cutters, are heavy, solid, wedged-in—thus no brazing strains. No hammers or special tools are needed to tighten them—a simple hex wrench suffices—thus breakage and wedge distortion are minimized. Blades are available in two styles—for cutting a square shoulder or to a 45° corner. They are interchangeable in all slots of any size cutter body of the same type. Wedges are round and are interchangeable in any slot of any size cutter, either right- or left-hand. They do not have to be pried out, but can be loosened with a soft hammer.

Other features of this cutter include: (a) Mountable on any common spindle; (b) More blades per inch of cutter diameter; (c) Suitable for all cast-iron milling jobs, either roughing or finishing; (e) Ample wedge clamping area; (f) No threaded holes in body to strip out; (g) Adequate wedge-width tolerance to allow for wear on the wedge and cutter-body blade-slot wall; (h) Chip-clearance room for heaviest cuts; (h) Infinite adjustability of blades.

The Style MF is made in seven cutting diameters: 6, 8, 10, 12, 14, 16, and 18 in.; either right or left-hand.

Kennametal Inc., Latrobe, Pa.

Explosion-Proof Solenoid Housing For Pilot-Controlled Valves

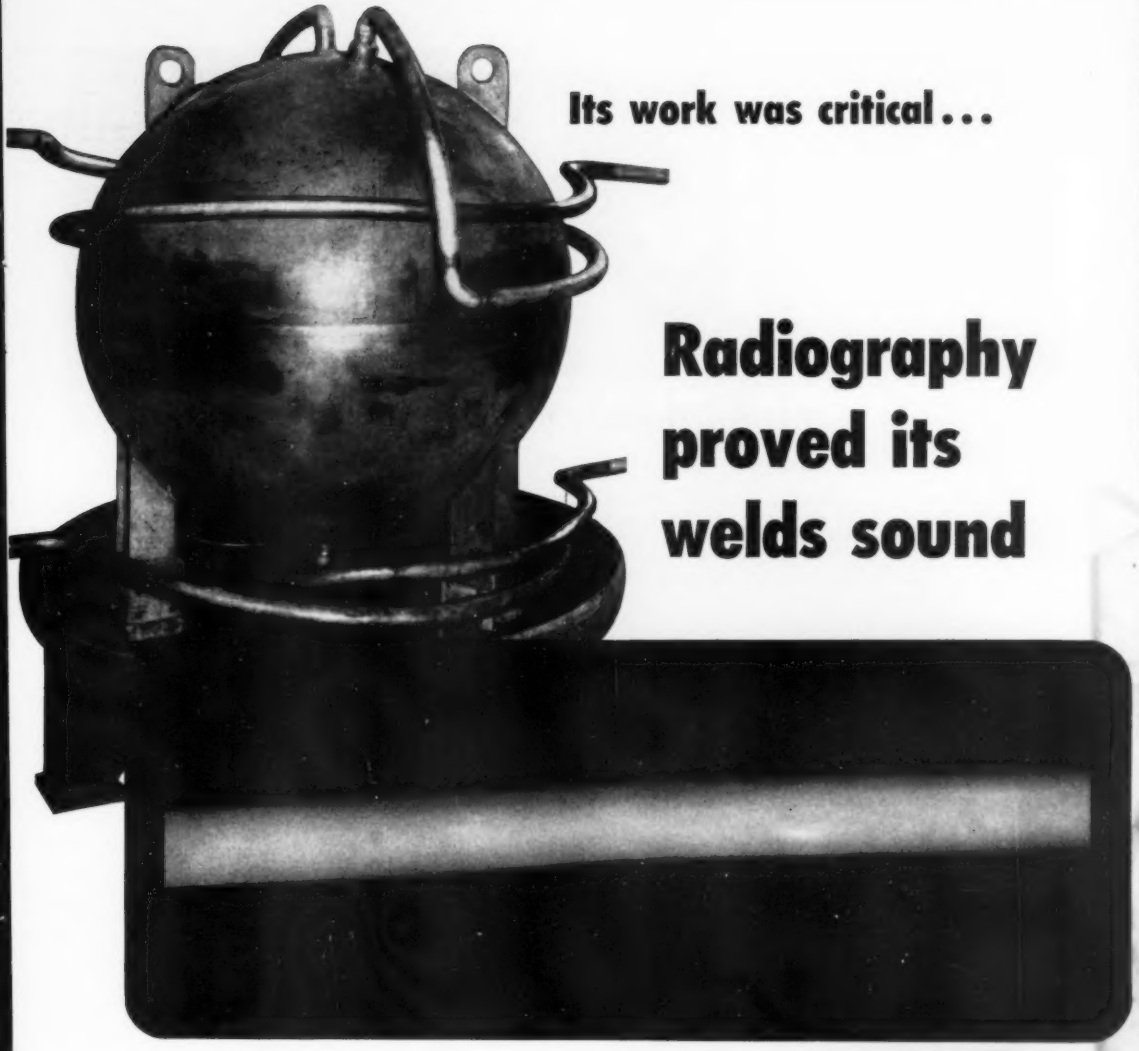
The cover on this solenoid can be used wherever fire and explosion hazards exist. It is manufactured of cast-aluminum to Underwriters' Laboratory specifications, Class I, Group D, Air Break Type.

Provision is made for standard electric-conduit connection. The cover may be used with ¼- to 1¼-in. Ross pilot-operated straight-way, three-way, four-way five-port models for single-solenoid operation. It may also be used for double-solenoid, momentary operation of Ross base-mounted pilot-controlled valves.

Ross Operating Valve Co., 120 E. Golden Gate, Detroit 3, Mich.

Coating machine, the Gyromat, applies from 0.0008 to 0.025 in. thickness of material at one pass and at high speed. High-speed rotors atomize and direct the paint to the work being passed through the rotating bowl. Excess material is caught in a rotating inner bowl and returned to the annulas. Coatings can be applied to a wide variety of parts.

The Gyromat Corp., P. O. Box 600, Fairfield, Conn.



Its work was critical...

Radiography proved its welds sound

THIS welded sphere was made to do a vital job in an important project. The welded girth seam had to be sound. What's more, the engineers had to know it was sound.

That called for radiography. For radiography would reveal any serious lack of fusion or gas porosities. It would prove the soundness of the weld.

This is one reason radiography has opened new fields to welders. It is the reason welding has become accepted even in making pressure vessels.

If you would like to discuss the ways radiography can help increase your business and build a reputation for high-quality work, get in touch with your x-ray dealer.

EASTMAN KODAK COMPANY
X-ray Division · Rochester 4, N. Y.

Radiography...

another important function of photography

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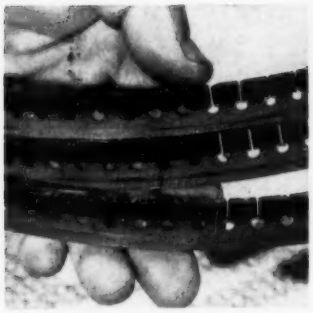
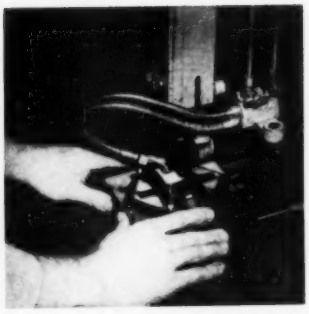




Welded Hard-Metal-Grinding Band For DoAll Bandsaws

Vertical grinding on inside, outside, and contour cuts in hardened metals, is said to be possible with DoAll's Grind Band. It is for use on the firm's Contourmatic band machine. This is claimed to be the first cutting tool and machine combination for precision grinding of hardened metals.

The continuous band tool reduces limitations on depth and height of cut as well as contour shaping. It is constructed of a tough alloy band on which cubical molded abrasive matrices are welded. In its cutting action there is an equalized balance between bonding and abrasive grits which gives a constant degree of abrasive exposure.

The band is available in two types and in two grit sizes, furnishing a complete selection for grinding and cutting various types of hardened materials. One band is made of aluminum oxide for grinding heat-treated alloy steels, heat-resistant steels, and wear-resistant non-ferrous alloys. The other is a silicon-carbide band, recommended by the company for grinding and cutting of geological, silicified, and vitrified materials.

The DoAll Company, Des Plaines, Ill.

Portable Abrasive Wheel Has Eight Backup Brushes

The Sand-O-Flex sanding wheel is particularly recommended for use on portable electric drills and flexible shafts because of its light weight and compactness.

The cover has been concaved to allow the knurled nut, which holds the cover in place, to be inset flush with the face of the tool—reducing bulk and increasing maneuverability. The weight of the unit has been decreased by four ounces for easier handling.

The sander has eight replaceable brushes fastened to its perimeter. These brushes backup and cushion the eight strands of abrasive cloth, 1-in. wide, which unwind from a central core. As the wheel rotates, the strips mold to the contour of the work. When the wheel rotates at normal speed, it delivers 14,000 sanding strokes per minute. As the abrasive wears it is cut or torn off and new is fed out from the central magazine.

Merit Products, Inc., 4023 Irving Place, Culver City, Calif.

Uniworld Electro Steels Save 50% on Critical Alloys

This series of electro-steel alloys has the following features:

(a) High yield strength to tensile-strength ratio of 75,100:95,300 psi in the hot-rolled, fully annealed condition. They compare with standard austenitic stainless steels which have a ratio of about 40,000:80,000 psi.

(b) An austenitic, non-magnetic structure even after severe cold working. For instance, cold-finished wire of 0.004 in. dia and 300,000 psi tensile strength is dead austenitic, non-magnetic.

(c) Moderate hardness of 82 R_b in the annealed condition.

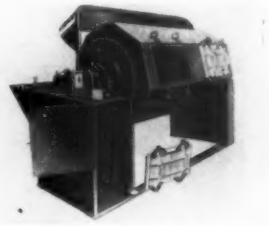
(d) High ductility: The alloy has an elongation of 49% and a reduction in area of 64.5% in the fully annealed condition.

(e) High tensile strength at elevated temperatures: All tensile values are higher than those of stainless 25-12, 18-8 Mo, 18-10 Ti, and 18-10 Cb.

Improved corrosion resistance especially against different concentrations of sulphuric acid. The alloys range in the A classification when exposed to these solutions at room temperature and in the B class at elevated temperatures.

Known as Super Rustfree steels, they save in critical materials as they do not contain Cobalt, Columbium, Titanium, Zirconium, and use considerably less nickel than alloys of similar performance. The alloys are weldable, and some can be used as filler material.

Uniworld Research Corp. of America, Cleveland, Ohio



Murray Tumbling Barrels

Murco tumbling barrels have both the motor and operating mechanism totally enclosed. The only exposed parts are the controls and the magnetic reversing starter. A limit switch permits operation only when the hood is closed.

Illustrated is the 7½-hp model that operates at a constant 25 rpm. The variable-speed 7½-hp model has a range from 8 to 25 rpm. Speed changes may be made while the barrel is rotating on the latter model—with no changes of belts or pulleys.

The foot-operated hydraulic brake stops the barrel in any position. Other models available include 3- and 5-hp variable- and constant-speed units.

D. J. Murray Mfg. Co., Wausau, Wis.

are you spending $5664

TO DO A $1417 JOB?

A Chicago plant* was! Oil consumption for their 5 high speed machines ran to $5664 a year . . . yet machine break-downs and bearing replacements were frequent . . . stock spoilage and rejects were high – until they made an important 30 day lubrication test.

This test involved the installation of an *Alemite Centralized Lubrication System* on a single mammoth machine. After a month of daily cost checks and comparisons, the system was installed on all five other machines in the plant at a total cost of only $2471. Since that time, there has not been a single break-down or bearing loss, stock spoilage and rejects have been greatly reduced, and lubricant cost has been cut to $1417. Net savings from this company's smart investment: $4247 annually. The net result: more production gained from each machine, marked product improvement, increased customer satisfaction!

Call Your Alemite Lubrication Engineer

No matter what size or type of plant you operate, Alemite can show you dozens of ways to save through the more efficient handling of petroleum products. Call your local Alemite Industrial Distributor now or send for the free booklet "11 Ways to Cut Production Costs." Simply attach the coupon below to your letterhead. Dept. C-71, 1850 Diversey Parkway, Chicago 14, Illinois.

*Name on request.

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1. In transferring lubricants... cuts man hours 63% for every 100 pounds transferred. No mess, no contamination.

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FREE! Valuable booklet—
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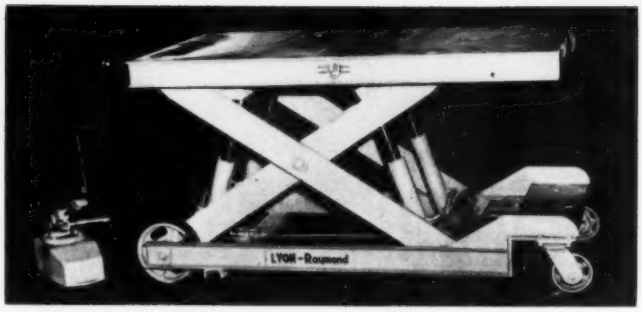
Simply attach this coupon to your letterhead and we'll include facts on the new Alemite Oil-Mist System, too—OIL-MIST atomizes oil into mist, circulates it to bearings under pressure. Increases life of bearings as much as 17½ times.

ALEMITE, Dept. C-71
1850 Diversey Parkway, Chicago 14, Ill.

Name

Company

City State



Compact Sheet-Feeding Table Uses Scissor-Action Lift

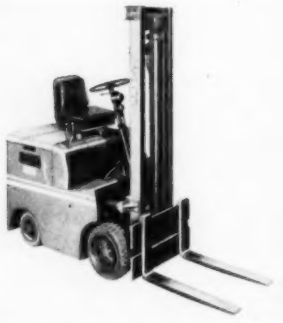
Long sheet-feeding tables are often at a disadvantage when handling small, compact bundles. For example, a long table may be damaged by having a concentrated load placed at one end. Lyon-Raymond has designed a model for the smaller, square, or nearly square sheets with a table of short length and good elevation.

The scissors method of elevating the table provides more rigid support for off-center loads. Over-all length of the top is 66 in. with elevation from 18 in. in the lowest position to 36-in. maximum lift.

Hydraulic rams working against the lifting levers raise the table. Power is supplied by either foot-operated or motor-driven hydraulic pumps. The motor type pump is available with either push-button or pedal controls.

The table is offered in capacities of 6,000 and 10,000 lb. It is portable, having 6-in. swivel casters at the steering end and 10-in. rear wheels.

Lyon-Raymond Corp., 47-81 Madison St., Greene, N. Y.



Acceleration on Battery Truck Is Timed With Torque Required

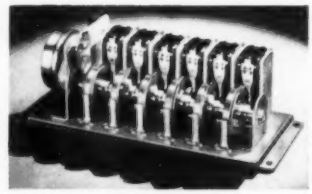
Another Clipper, a battery-powered fork truck, has been designed by Clark. It has increased speed, 2000-lb capacity at 24-in load center, "fingertip" directional lever, automatic acceleration, "dead-man" safety control, and other features.

The "fingertip" lever is mounted on the steering column. It gives selection of travel and simultaneous engagement of first point of power. This simplifies operation, increases manuevering speed, and permits fast getaway.

Automatic acceleration eliminates jerking and possibility of human error. Shifts from one point of power to another are timed in accordance with torque requirements.

When the driver's seat is vacated, the control lever locks in neutral, and a parking brake on the motor drive shaft is set automatically. The truck can be moved only when the driver's seat is depressed. The steering axle is pivot-mounted and cushion tires are employed.

Clark Equipment Co., Ind. Truck Div., Battle Creek, Mich.



Multi-Cam Recycling Timer Driven by Synchronous Motor

A group of cams, operating snap-action switches, is mounted on a single shaft driven by a synchronous motor. Thus all cams rotate simultaneously, and continuously repeat a time cycle that is common to all circuits.

Percentage calibrations on each cam face permit the cams to be individually adjusted for on-off electrical periods. The range is from 2 to 98% of the cycle. The time cycle can also be changed by substituting simple rack assemblies in the drive between the motor and cam shaft.

In addition, each cam is independently adjustable to permit a specific, over-all timing sequence to be obtained. This is accomplished by rotating each cam with finger pressure, using its drum calibrations for guidance in a range from 0 to 100% of one cam revolution.

Nine models are available, with time cycles ranging from 1 rev in 40 sec to 1 in 72 hr.

Industrial Timer Corp., Newark, N. J.

Small Wet Blaster Has No Moving Parts

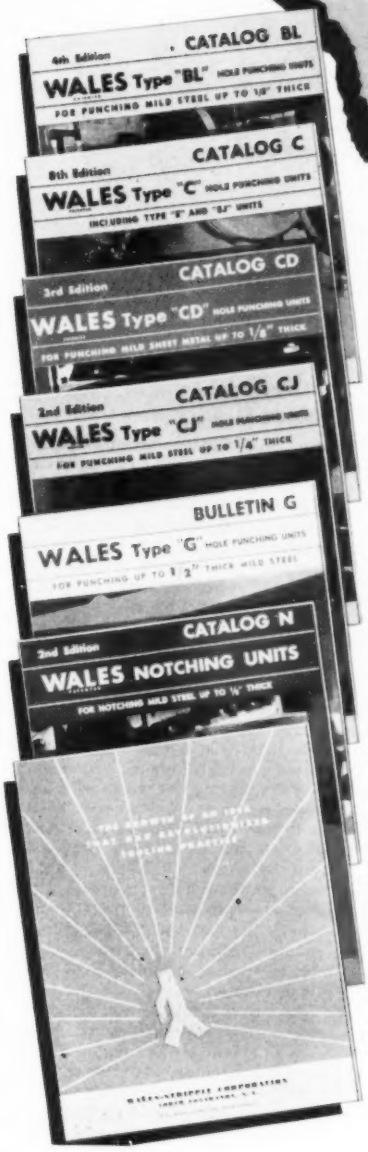
The Cro-Hone Jr. uses a fine abrasive (suspended in water) which is forced against the metal parts by air pressure through a siphon jet gun. Of stainless-steel construction, the unit has no moving parts or circulating pumps making maintenance costs low.

The metal parts to be finished are inserted through the front window door. All openings are furnished with splash-proof guards. The controls are located within easy reach on the side of the cabinet and the large clear-view window enables the operator to watch the progress of the work. A blower clears away splash so that vision is not obscured. The work is held in one hand, the gun in the other.

A removable filter makes cleaning and changing simple. All that is needed for operation is a $\frac{3}{8}$-in. air and $\frac{1}{2}$-in. water connection.

Cro-Plate Co., Inc., 747 Windsor St., Hartford, Conn.

It's a good rule to check with


4th Edition
CATALOG BL
WALES Type "BL" HOLE PUNCHING UNITS
FOR PUNCHING MILD STEEL UP TO 1/8" THICK
8th Edition
CATALOG C
WALES Type "C" HOLE PUNCHING UNITS
INCLUDING TYPE "E" AND "EJ" UNITS
3rd Edition
CATALOG CD
WALES Type "CD" HOLE PUNCHING UNITS
FOR PUNCHING MILD SHEET METAL UP TO 1/8" THICK
2nd Edition
CATALOG CJ
WALES Type "CJ" HOLE PUNCHING UNITS
FOR PUNCHING MILD STEEL UP TO 1/4" THICK
BULLETIN G
WALES Type "G" HOLE PUNCHING UNITS
FOR PUNCHING UP TO 1/2" THICK MILD STEEL
2nd Edition
CATALOG N
WALES NOTCHING UNITS
FOR NOTCHING MILD STEEL UP TO 1/4" THICK

1. CATALOG BL featuring Wales Type "BL" Hole Punching Units for punching mild sheet steel up to 1/8" thick.

2. CATALOG C featuring Wales Type "C" and "E" Hole Punching Units for punching angles, channels, and extrusions up to 1/8" thick.

3. CATALOG CD featuring Wales Type "CD" Hole Punching Units for punching holes over the entire sheet in mild steel up to 1/8" thick.

4. CATALOG CJ featuring Wales Type "CJ" Hole Punching Units and Type "CN" Notching Units for punching and notching mild steel up to 1/4" thick.

5. BULLETIN G featuring Wales Type "G" Hole Punching Units for punching mild steel up to 1/2" thick.

6. CATALOG N featuring Wales Type "N" Notching Units for notching mild steel up to 1/8" thick.

7. "THE GROWTH OF AN IDEA" BULLETIN describes and illustrates the evolution of Wales Equipment and what it will do for you.

WALES

before punching or notching angles, channels, extrusions and sheets – BY ANY METHOD

● Save your valuable time and effort in designing and building special hole punching and notching dies by calling on Wales-Strippit FIRST for their recommendations.

A large percentage of the time of Wales engineering staff is spent in consultation . . . in recommending . . . and in developing applications for Wales independent, self-contained STANDARD Hole Punching and Notching Equipment. Wales Service Engineers are strategically located throughout the country. Tap their wide experience by putting your fabrication problems up to them TODAY.

The catalogs at left describe and illustrate Wales Hole Punching Units that punch mild steel up to ½" thick and Wales Notching Units that notch mild steel up to ¼" thick.

Fill in coupon below and have Wales fully-illustrated, functionally colored catalogs at your finger tips.

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Specialists in Punching and Notching Equipment

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373 Payne Avenue, North Tonawanda, N. Y.

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☐ 2. CATALOG C ☐ 4. CATALOG CJ ☐ 6. CATALOG N
☐ 7. "THE GROWTH OF AN IDEA"

*Name*_____
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*Title*_____
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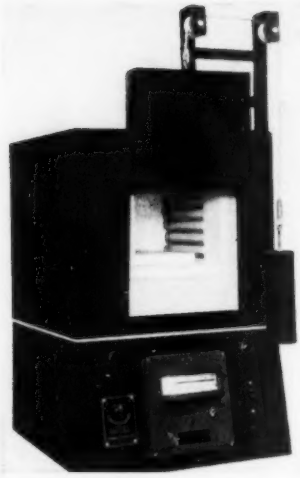
*City*_____ *State*_____



Hardening and Tempering Furnace Is Automatically Controlled

This combination hardening and tempering electric furnace gives the operator automatic control of temperatures in a range from 300 to 2200 F. Control is through the Huppert Infitrol and an electronic device. The lower temperatures enable the furnace to do tempering work.

Known as the No. 869, it is 8 in. wide x 6 in. high x 9 in. deep with a max. current consumption of 4 kw. It is wired for 220-v, single-phase operation. The furnace has a counterweighted door which rides in a wedge slide. The heating elements are made of non-sealing, non-flaking, high temperature, coiled alloy wire.

The model comes in either bench or floor types. When equipped with the Infitrol and pyrometer the low temperature is 1000 F.

K. H. Huppert Co., Chicago, Ill.

Tables for Special-Purpose Machines or Drillpresses

These tables are for setting up special-purpose machines or multi-spindle drillpresses.

Each table section is 23⅜ in. wide x 30 in. long. With the addition of the end sections, the length is increased to 35 in. With these sections, it is possible to build up any table length desired. A drain trough for carrying off coolant in wet-cutting operations is provided. Each end section has a ¾-in. pipe tap for connecting to coolant systems. Cast-iron legs are used for mounting the sections.

Any Delta 17-in. or 14-in. drill-press head can be installed on the sections and on centers to meet individual requirements. This means all 17- or 14-in. heads, or a combination of both can be installed spaced any distance apart. Or any special-purpose machine can be made up.

Delta Power Tool Div., Rockwell Mfg. Co., Milwaukee 1, Wis.

Filterless Dust Collector Exhausts to Atmosphere

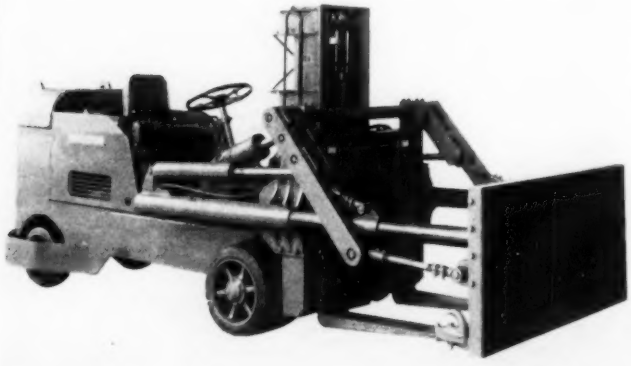
Model 4N20 Dustkop collector is intended for dust sources having toxic fumes, vapors, or obnoxious odors. A small unit (12 x 23-in. floor space), it nevertheless develops a rated 437 cfm and 500-fpm velocity at the inlet opening.

The amount of suction is adequate to handle a buffing, polishing, or grinding wheel up to 10-in. dia, or two wheels for similar work from 3- to 7-in. dia. Sanding operations with belt or disk sander on rubber or synthetic are other recommended uses for the collector.

The unit is self-contained, motive power being a 1/3-hp, 3600-rpm continuous-duty motor direct driving a paddle-wheel fan. The dust-laden air is sent into a cyclone separator. Here all the material is removed from the air except the odors, toxic fumes and extremely fine dusts. The latter are exhausted to out-of-doors through the outlet at the top of the cyclone. Ordinary sheet-metal pipe may be used to complete that part of the installation.

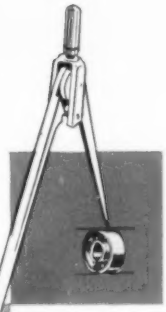
The unit is available with optional inlets as follows—single 3 in., single 4 in., double 3 in. The motor is for 110-v, single-phase, 60-cycles or 220- or 440-v, 3-phase, 60-cycles.

Aget-Detroit Co., 130 Main St., Ann Arbor, Mich.



HANDLING HEAVY DIES, and transporting them to and from the press table is simplified by this accessory. The die is lifted and transported with the pusher plate retracted, and is unloaded onto the die table by extending the plate to the position shown in the photo. To pick up a die, a chain is passed around it and linked to hooks at each side of the plate. When the plate is retracted, the die is pulled onto the forks.—*Towmotor Corp., 1226 E. 52nd St., Cleveland 10, Ohio*

PRECISION TURNING POINTS



for tiny shafts

For extremely small shafts in fractional h.p. motors, instruments, home appliances, cameras and projectors, Fafnir makes several series of *extra small ball bearings* . . . in metric bore sizes down to 4 mm and in inch sizes down to 1/8".

The advantage of these small bearings show up in several ways. For the portable converter illustrated, they assure instantaneous, dependable response no matter how long it has remained idle. Bearing lubrication is eliminated . . . under normal conditions. Shaft wear reduced to a minimum.

Fafnir Extra-Small bearings are available with standard, special or super-precision tolerances . . . in various constructions. They can be fitted with grease shields, Mechani-Seals or Plya-Seals.

An important reference catalog

The new Fafnir Instrument Ball Bearing Catalog provides valuable data on dimensions, load ratings, tolerances, mountings etc. Also information on ball bearing standards and illustrations of typical applications. Send for a copy. The Fafnir Bearing Company, New Britain, Conn.

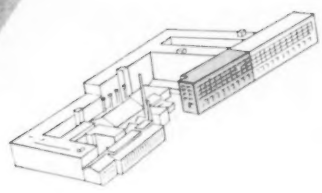
FAFNIR

BALL BEARINGS

MOST COMPLETE LINE IN AMERICA

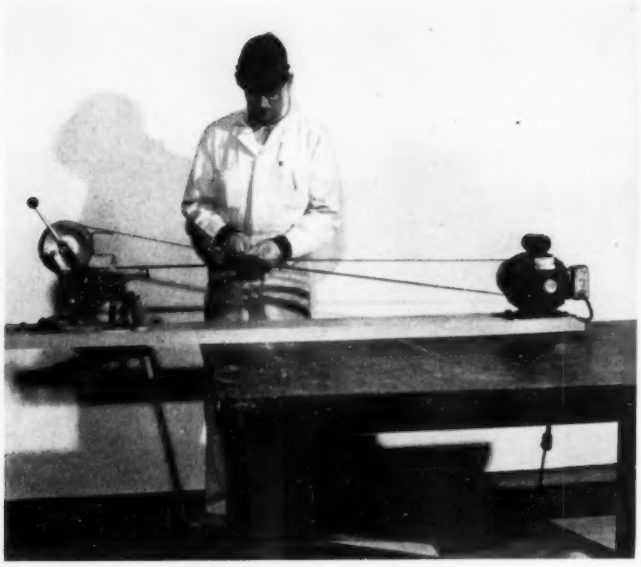
★ PROGRESS REPORT

DOING OUR BEST



To try to keep abreast of an unprecedented demand for Fafnir Ball Bearings we're doing our best to provide greater production facilities.

One phase of this expansion program is the recently completed, 6-story modern addition to the main Fafnir Plant. It adds 70,000 square feet of manufacturing space to the 750,000 previously included in the 4 Fafnir Plants . . . now, almost 19 acres.



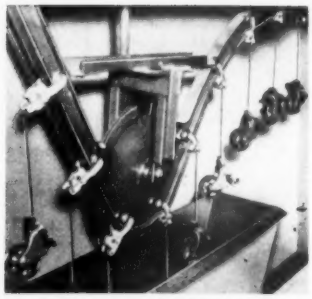
Backstand Grinding Unit for Multi-purpose Applications

Inside-diameter grinding, polishing, and deburring operations are said to be greatly simplified by the adaptation of the backstand method of coated-abrasive-belt finishing to a belt-strapping unit.

The unit is easily set up with a polishing jack on a motor drive and a spring-tension, small backstand idler. No shut-down time is involved in threading the coated abrasive belt through the opening of the piece with the ID to be finished, the operator merely releases the belt tension with a foot-treadle which allows for belt slippage at the drive motor.

The Metalite Cloth abrasive belts are supplied in grit ranges from very fine to very coarse for applications ranging from fine finishes needed prior to plating, to the rough removal of mold fins.

Behr-Manning Corp., Div. of Norton Co., Troy, N. Y.



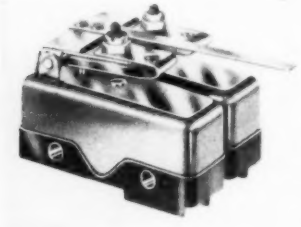
Cleated Conveyor Belt Eliminates Manual Handling of Stampings

Known as the Pressvator, the device is a small, cleated conveyor, self-powered and adjustable to various loading and unloading heights.

As the parts drop from the stamping press, they are automatically picked up and delivered to a tote box or truck, or elevated to a gravity chute leading to the next operation. Damage to parts is eliminated, since the belt handles them singly.

The model illustrated is the P-1206. Length is 6 ft 5 in. (center to center of pulleys). The 12-in.-wide, 4-ply cotton belt, has a 1-in. cleat every 24 in. It is powered by a ½-hp gearhead motor which drives the belt at 72 fpm. The minimum loading height is 7 in.; the max. unloading height, 61½ in.; max. inclination, 45°.

E. W. Buschmann Co., Dept. 2-A, Cincinnati, Ohio



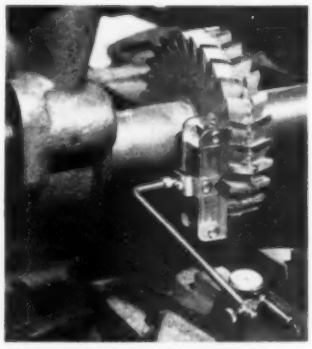
Ganged Precision Switches

The SAT-1-X1 ganged-switch assembly provides for operation of two snap-acting SPDT switches by a single actuating mechanism and for individual setting of the operating point of each unit in the assembly. This construction permits two, three, or four switches to be installed for simultaneous operation or for operation in special sequences.

The assembly is made up of the SPDT switches having common bushings through the mounting holes so that the entire assembly can be held by two No. 6 screws. A rigid bar joins the Adaptaplates of the individual switches so that they all work together. The operating point for each switch is adjustable by a setscrew that moves a U-spring toward or away from the operating pin. The spring also absorbs over-travel of the actuator arm. The setscrew is held by an Elastic Stop Nut.

The actuator bar, U-springs, and hinge members are of stainless steel and the setscrews have a corrosion-resistant finish.

Unimax Switch Div., The W. L. Maxson Corp., 460 W. 34th St., New York 1, N. Y.



Magnetic Indicator Holder

The Erik Magna-Holder saves the time usually required to check out and setup old style indicator holders. The holder can be applied to round, flat, or angled surfaces. Permanent Alnico magnets hold it with a 30 to 35 lb pull. Universal settings are made possible by a non-magnetic, stainless-steel holder arm set in a ball socket. Price—$2.95.

Passing Eye Inc., Kenosha, Wis.

a quick check-up may avoid trouble

Don't allow wear in gage blocks to cause unexplained difficulties in assembly. When trouble develops start checking the blocks immediately.

If they have been used daily for any long period of time they should be examined just to make sure their accuracy is still within tolerated limits. Better yet send them to us before trouble occurs. You may find that only a few blocks need replacement.

Instead of discarding an entire set, replace those that need replacement and save money in doing so. The set will be returned within 24 hours after it is received with a certificate of inspection, noting the degree of wear of each block. Webber Gage Company, 12901 Triskett Rd., Cleveland 11, Ohio.

★

INSPECTION SERVICE INCLUDES:

1. Comparison with master blocks certified by the U. S. Bureau of Standards.
2. Removal of burrs and nicks which impair accuracy.
3. Notation of degree of wear of each block.
4. Identification of those blocks that are worn or damaged beyond repair with recommendation for replacement.

$16.50 FOR 84 BLOCK SET

smaller sets proportionately lower . . . all makes of blocks inspected.

Webber

MICRO-ACCURATE GAGE BLOCKS & FIXTURES

LARGEST EXCLUSIVE MANUFACTURERS OF GAGE BLOCKS

Hydraulic Center Post On Portable Shop Crane

The hydraulically operated center post provides a range of lifting heights to suit the specific job. The mechanism is hand operated and provides a simple and positive control. A winch to raise the load is used. Seven turns on the winch handle raises the load one ft.

The crane has a lift of 9 ft 8 in. and a capacity of 5000 lb. The 8-in. roller-bearing wheels are standard. The unit is manufactured by the Grand Specialties Co. of Chicago.

Allied Mfg. & Sales Co., 230 E. Ohio St., Chicago 11, Ill.

Variable-Speed Electric Tachometer

An electric tachometer has been designed for motor applications requiring continuous and accurate speed indication. It is used as an accessory to the varidrive motors produced by U. S. Electrical Motors, Inc.

The sturdily-built, permanently lubricated, ball-bearing generator is coupled to the varidrive motor and requires no other source of power. The tachometer indicator is entirely sealed and can be mounted up to 300 ft from the motor without affecting its accuracy. The indicator dial is calibrated as a percent of the maximum speed.

Varidrive motors are now supplied with model R-1 tachometer and generator in ratings from ¼ to 50 hp and speeds from 2 to 10,000 rpm.

U. S. Electrical Motors, Inc., Los Angeles 54, Calif.

Short-Flute, Spiral-Pointed Tap

This tap has spiral flutes extending only a short distance from the point. There is, therefore, an uncut cross-sectional area to provide extra strength at the point of greatest strain. This is particularly important where extreme misalignment exists.

The tap is also good for tapping through holes in sheet metal and thin sections where the length of thread does not exceed one dia.

They are available in high-speed, ground-thread fractional and machine-screw sizes.

Bay State Tap and Die Co., Mansfield, Mass.

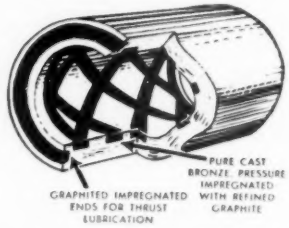
Indicator Shows Forging Squeeze

An old shop question, "How much tonnage does a forging actually require?", is answered by an indicator showing squeeze in tons.

Advantages include: (1) Forging to closer tolerances without overload; (2) Simpler selection of the proper size press for a given job; (3) Faster die setup; (4) Any variation in press loads gives quicker warning of low heats, improper die setups, or incorrect die impressions.

The device will become standard equipment on the company's new Maxi-presses.

National Machinery Co., Tiffin, Ohio



Oil-Less Bearings and Bushings

Gopi bearings and bushings are:

Graphited—Only pure graphite is used with a tenacious binder.

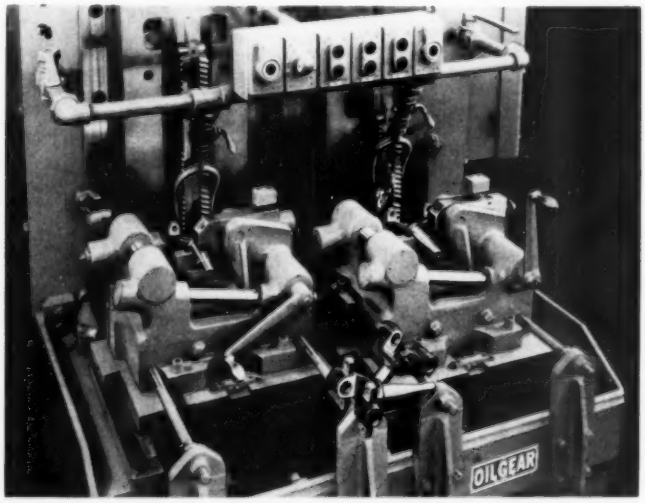
Oil-less—Requires no further lubrication during the life of the bearing.

Pressure—The graphite is applied under pressure by hydraulic or other adequate means, then baked at high temperature for permanence.

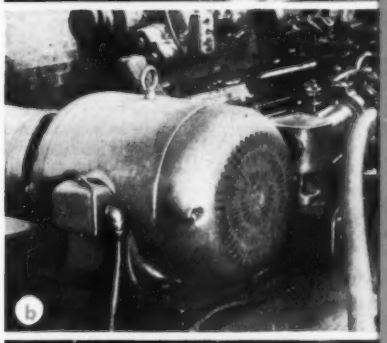
Impregnated — Complete surface coverage, giving the working effect of a metal saturated with lubricant.

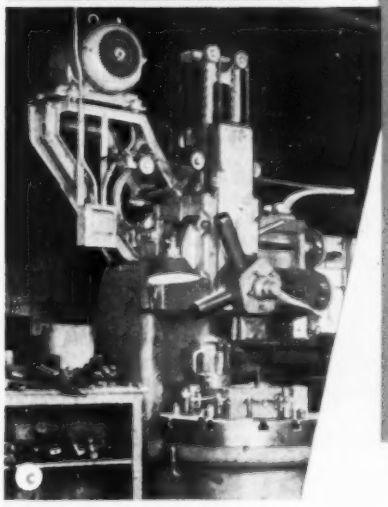
The sketch shows method of impregnating the bronze bearings with the graphite.

Bronze Bearings Inc., 412 North Ave., East Cranford, N. J.



DUPLICATE SETS of manually operated fixtures and tools are used to finish-broach four U-openings in forged-steel steering-knuckle spindles in one pass. Vertical double-slide broaching machine is the Oilgear Type XD, 10x42-in. stroke. Rate is 410 parts per hr at 85% efficiency. Approx. 0.040 in. stock is removed from each surface at max. cutting speed of 30 fpm. —*The Oilgear Co., 1560 W. Pierce St., Milwaukee 4, Wis.*





In Atmospheres Containing Dust, Mist, Dirt, Fog... Protect the Power that Drives Your Production Machines

...Use Century

Totally Enclosed Fan Cooled Motors

In locations where the air is charged with substantial quantities of metallic or abrasive dusts, coolant mists or fog, or oil-laden factory dusts, Century Type TEFC Motors assure protection to help maintain uninterrupted production.

Because the vital parts of the motor are sealed in an inner frame, they are isolated from the outside atmosphere. A large fan blows cooling air between the inner and outer frames—keeps the motor temperature well within safe limits.

Wherever there are adverse atmospheric conditions, specify Century Totally Enclosed Fan Cooled motors, to give you the extra assurance that production will be maintained.

Other types and kinds of Century motors are built in sizes from 1/6 to 400 horsepower—designed to meet all popular industrial requirements.

CENTURY ELECTRIC COMPANY
1806 Pine Street, St. Louis 3, Missouri
Offices and Stock Points in Principal Cities

Century Electric Company is celebrating its 50th Year in the electrical industry.

Century C MOTORS

(a) Surface grinder with Century 5 horsepower TEFC motor mounted near the floor.

(b) Century 15 horsepower TEFC motor operates in coolant fog from this grinder.

(c) Boring Mill with Century 5 horsepower TEFC motor.

ALTERNATING CURRENT MOTORS
POLYPHASE
Squirrel Cage Induction—1/6 to 400 H.P.
Wound Rotor Motors—1 to 400 H.P.
Synchronous Motors—20 to 150 H.P.

SINGLE PHASE
Split Phase Induction—1/6, 1/4, 1/3 H.P.
Capacitor—1/6 to 20 H.P.
Repulsion Start, Brush Lifting, Induction—1/2 to 20 H.P.

DIRECT CURRENT MOTORS
1/6 to 300 H.P.

GENERATORS
AC, .63 to 250 KVA
DC, .75 to 200 KW

GEAR MOTORS
1/6 to 1 1/2 H.P.

MOTOR GENERATOR SETS
AC to DC, AC to AC
DC to DC, DC to AC

Open Protected, Splash Proof, Totally Enclosed Fan Cooled, Explosion Proof

703

A "stock quotation" that pays big dividends

SIMONDS ABRASIVE CO.

Grinding Wheels

"All the boys ask for Simonds wheels," says the storekeeper. Why? Because they can count on top production and fewer rejects with Simonds Abrasive Company wheels. They're proven producers—accurately specified for every job . . . a real investment in greater grinding efficiency for you. Free data book describes Simonds complete line of grinding wheels, mounted wheels and points, segments and abrasive grain. Write for it . . . and the name of the Simonds distributor ready to serve you.

SIMONDS ABRASIVE CO., PHILADELPHIA 37, PA. BRANCH WAREHOUSES: CHICAGO, DETROIT, BOSTON
DISTRIBUTORS IN PRINCIPAL CITIES

Division of Simonds Saw and Steel Co., Fitchburg, Mass. Other Simonds Companies: Simonds Steel Mills, Lockport, N. Y., Simonds Canada Saw Co., Ltd., Montreal, Que. and Simonds Canada Abrasive Co., Ltd., Arvida, Que.

ROUND TABLE Discussion

SAFETY LAST

EVIDENTLY, AL AND ED are more nearly in agreement than has been the case many times, they both realize the seriousness of the situation in that particular plant.

The state and the nation at large, as well as individuals should be interested in promoting safety and should feel a vital concern about it for it is in the line of progress.

Not only is greater safety required in the places where men are employed, but, in their homes as well, and every day this is made more evident and yet, carelessness is the rule upon the part of many employees, is usually the rule in most plants.

Probably, 90% of the occupations listed in the records could be made safer than they are at present and would come under the subject known as Industrial Hygiene, which is a branch of sanitary science and employment safety. It involves careful study of physical, economic and socialogic factors pertaining to the daily life of at least two thirds of our population.

Specifically, it calls for discovery, prevention and correction of all causes of human disability which, many times are called to the attention of physicians, surgeons, and nurses.

There are many maladies, often termed "occupational diseases," so called because the occupations are the underlying causes of them, so, great care should be exercised in diagnosing and treatment.

In some states, regular official inspections are required to be made by chemists, physicians and safety engineers, and, added to this, a few of them require the inspection and advice of an expert in ventilation and one in fire prevention makes regular calls to promulgate greater safety.

We return to Al and Ed. They mention a campaign for safety.

In many plants, usually near the time clocks, bulletins are posted and there may be a sign showing the number of days since there was a lost time accident.

There was one such sign upon which there was the phrase, "1352 days without a lost time accident." There were about 2200 employees in the plant and every man took pride in keeping up this good work.

Devices, such as machine guards, hoods for different kinds of abrasive

MUELLER BRASS CO.

600 series a better bearing bronze containing no hard-to-get tin

Four typical parts forged from Mueller Brass Co. "600" series Bearing Bronze.

If you use gears, connecting rods or other parts of bearing metal in your products, it will pay you to investigate Mueller Brass Co. "600" series, a forgeable bronze that *contains no critical tin.* This bearing metal outperforms phosphor bronze and other bearing metals and will save you money in your applications. "600" series bearing metal can be forged into relatively complicated shapes and produces a forging of close-grained homogeneous structure impossible to get in a casting. The forged shape is closer to finished size than a casting and requires less machining. "600" series alloys have a low coefficient of friction, a tensile strength 2½ times greater than cast phosphor bronzes and a high resistance to corrosion. "600" has a 25 year record of outstanding performance on some of the toughest bearing applications. There is a "600" series alloy with the properties to fit your bearing metal needs . . . write today for further facts.

MUELLER BRASS CO.

PORT HURON 18, MICHIGAN

64

UNITCAST PRESSES

. . REDUCE FINISHING TIME—
. . GIVE MINIMUM TOLERANCE LIMITS!

Shown above are three presses ranging from 250 to 600 ton capacities, another important part of Unitcast's facilities that add quality to the product.

- **Do your castings assemble freely and within tolerance limits?**
- **Do your castings fit machining fixtures properly, consistently?**
- **Are your finish allowances held to a minimum?**

INTERCHANGEABILITY has long been recognized as the forerunner of mass production. Unitcast daily production is held to the specified dimensional tolerances, assuring you this very important advantage.

UNITCAST ENGINEERS CONTINUE TO BE AT YOUR SERVICE

UNITCAST
Corporation
QUALITY STEEL CASTINGS

Give us a chance to offer a "cast steel" answer for your parts problem. Our suggestions while your product is in the design stage will pay continuous dividends. Write or call today. Unitcast Corporation, Steel Casting Division, Toledo 9, Ohio. *In Canada:* Canadian-Unitcast Steel, Ltd., Sherbrooke, Quebec.

UNITCASTINGS ARE FOUNDRY ENGINEERED

wheels, railings and toe boards, placed upon platforms are all good and are improvements, and "improvement is the order of the age."

In one state it was found that the occupations of more than 8,000 persons could be made safer, at little cost, when and as the recommendations were compiled with, the men felt safer and could work to better advantage, hence, production was materially increased, and that with no apparent effort upon the parts of the men.

Yes, safety is a great time saver and it behooves every plant, and homes as well, to safety up, and the wise one's do that very thing.

F. H. Stebbins
Worcester, N. Y.

•

WHO PAYS THE PIPER

Many places now are looking for bright young men that show signs of ingenuity in their job. As soon as they find one, they try to give him all the opportunity to develop his ideas and they make him feel that his work is appreciated and pay him for it. Some concerns help their men to develop their ideas and help them to secure patents on them, and then share in the profits.

Any conscientious supervisor who has his company's interest at heart will see that if a worker has any idea that will do the job better and quicker will see to it that the worker is reimbursed for his idea and will encourage others to do the same and to pay them let's say 25% of the first year's earnings and thereby have the company and the worker benefit by it. Any wide-awake supervisor will know what his men are doing; he will not let men overburden the machines' capacities so that the man that works piecework will be able to produce more, but in so doing will overload the machine driving mechanism, and motors will burn out. In that case the men and the company both lose, the company and the men will be idle until the machine or motor is repaired.

Michael Axler
Bronx, N. Y.

•

"SKILL STEALER"

"Honest bread is very well; it's the butter that makes the temptation." When it comes to labor stealing, the temptation of extra pay is usually the means of "buttering-up" the worker to leave his present position. However, it certainly does not reflect to the credit of the former foreman

"HIGH OUTPUT OF QUALITY WORK— NO LOST TIME FOR MACHINE FAILURE with DELTA SURFACE GRINDERS"

Operating a battery of Delta Toolmaker Grinders for all grinding operations, Tool Service Company of Milwaukee has won an enviable reputation in the Milwaukee industrial community as expert conditioners of tools.

As designers and grinders of cutting tools and bits, Tool Service praises the versatility, dependable accuracy and ease of operation of Delta Grinders—says that it maintains a consistently high output of highly special quality work with no lost time because of a machine failure

Wherever tools have to be sharpened and resharpened—from small shops up to big tool departments—there's a need for the basic quality in Delta Toolmaker Grinders Ruggedly built, designed for easy, simple, economical operation, Delta machines are distinguished for their accuracy

THREE TYPES OF DELTA TOOLMAKER® to meet every grinding need....

TOOLMAKER SURFACE GRINDER

A big, massive machine with the stability to assure accuracy. Rapid, close adjustments are easy The motor pulley and motor are balanced together to assure a minimum of vibration. The wheel and adapter can be removed and replaced with no further truing-up.

TOOLMAKER CHIP-BREAKER GRINDER

A precision machine for grinding the chip-breaker groove in carbide tipped tools. Of exceptional value is its special feature, the Univise—massive, rigid—can be set securely at *any conceivable angle*, and can be reset accurately in a few seconds. Easily and quickly adapted for use on the surface grinder.

TOOLMAKER TOOL AND CUTTER GRINDER

Ideal for sharpening milling cutters, reamers, taps, end mills and many other cutting tools, this versatile grinder helps to achieve extreme accuracy on a high production basis. The table swivels a full 90 degrees, with a graduated scale and positive lock—practically every angle can be easily and accurately ground.

For full information write for catalog

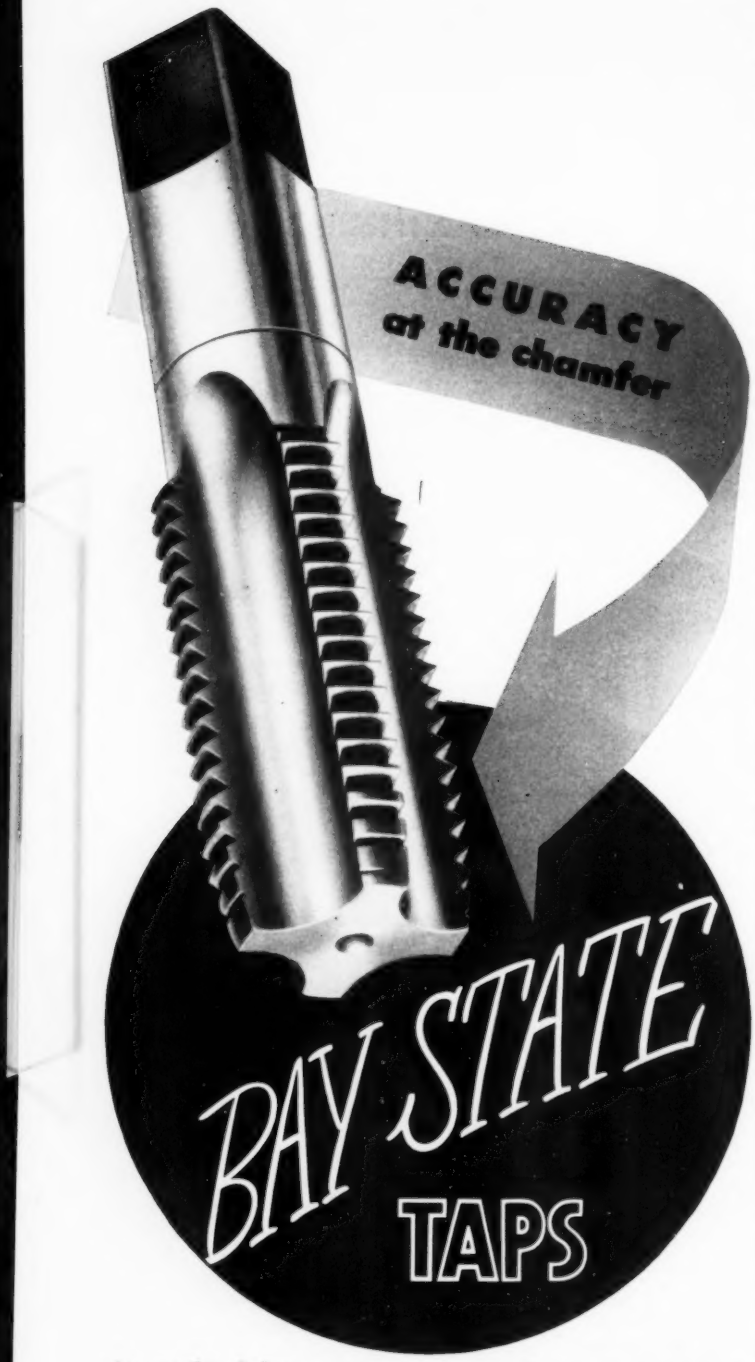
There's a Delta Power Tool for Your Job-

WOOD OR METAL WORKING

53 MACHINES • 246 MODELS • MORE THAN 1300 ACCESSORIES

For Delta dealers, see your Classified Phone Directory under "Tools"

DELTA POWER TOOL DIVISION
Rockwell MANUFACTURING COMPANY
609G E. VIENNA AVENUE, MILWAUKEE 1, WISCONSIN



On nearby shelves of industrial supply distributors

BAY STATE TAP & DIE CO.
Mansfield, Mass.

who makes a practice of inducing his former workers to work for him in his new shop.

Sometimes it's true that the less we know, the more we suspect. But the long arm of coincidence in these cases justifies the contention that the men did not go to the new firm because it is a better place to work. This would hardly be the guiding reason for the move. It's more than obvious that the foreman offered them some monetary inducement in his line as "skill stealer." The act, to my mind, was reprehensible, and does not reflect well on the character of the former foreman. Such a practice is destructive to former employer, and is more in the nature of a dog-eat-dog affair hardly conducive to better business ethics. The new employer who tolerates such action may someday be in the same sorry position as the former employer who is now getting the short end of the stick.

In the final analysis, "skill stealing" boils down to the basic problem of human frailty. Employers may endeavor to satisfy human interests of their workers but it is essential to remember that employees leave their jobs because of their own individual desires and characteristics. If all the people in the shop were industrious, temperate, well-behaved, capable, and satisfied, there would be no turnover problem, and the "skill stealer" would have no success. But it is well to appreciate that as long as human frailties persist, trials and tribulations of the employer are inevitable, and they are not the consequence of any particular actions that the em-

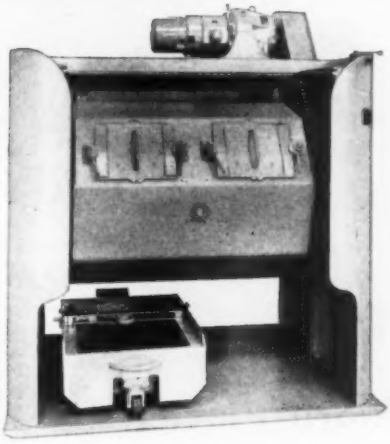
"Methinks we should have asked the master to step out before we started heat-treating his armour!"

CROWN TUMBLING EQUIPMENT

for deburring...
ball burnishing...
finishing

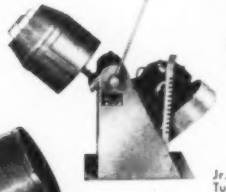
Lower your manufacturing costs by volume handling of the deburring, ball burnishing or finishing operations . . . get greater product uniformity and fewer rejects.

Remember—whether your product is die cast—steel—brass—or an alloy, there's a Crown tumbling machine to fit your requirements.

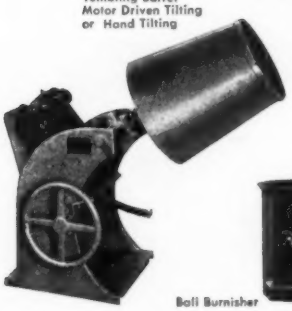


Horizontal Type
Tumbling Machine
Single Speed — Variable Speed

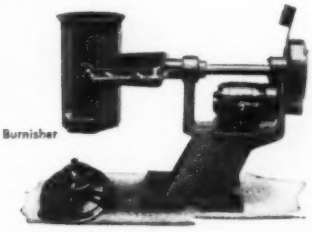
Bench Type Tilting
Tumbling Barrel



Jr. Tilting Type
Tumbling Barrel



Tilting Type
Tumbling Barrel
Motor Driven Tilting
or Hand Tilting



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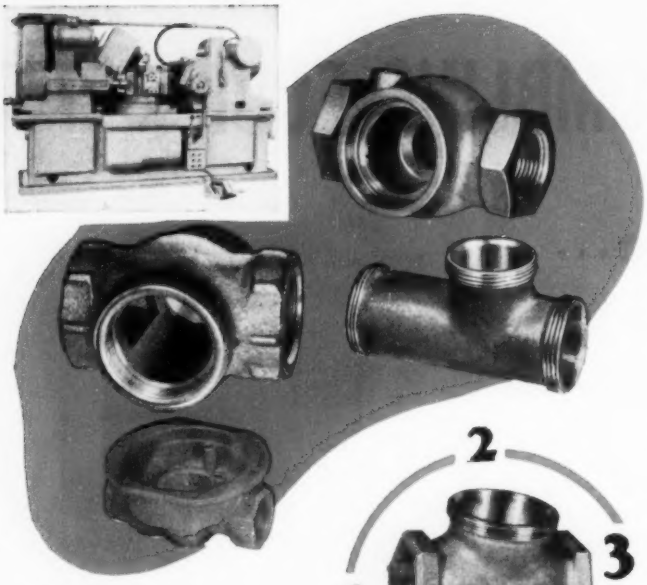

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This machine . . . already acknowledged and accepted as a metal-working achievement, and the only standard one of its kind . . . winds up a day's operation with all parts assigned to it completely finished and with no secondary operations necessary. When fully loaded, a complete piece is finished at each index cycle. High productivity is attained with simple tooling.

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ployer may or may not have taken with regard to the welfare of his employees.

Experience is now demonstrating that employe turnover can be minimized to a large extent, and the problem of labor stealing obviated, if both employer and employee know what each desire from the other. What management wants in its relatiion with its employees are improvement in the quality and quantity of work done; reduction in cost, not by lower wages nor by skimping the work, but by improved methods, higher efficiency on the part of the employee; attentiveness and interest of the worker in his work; loyalty and confidence on the part of the employee. The employee wants security of job and income; a fair wage for the work done; safe and efficient workplace and conditions; pride in the product, policies, and progress of the company for which he works; an opportunity to express his thoughts concerning his job and his relations with the business; some financial security against the hazards of sickness, accident, disability, and old age. The wants of both groups can be obtained by cooperation, confidence, and persistence.

One of the principal reasons for lack of job satisfaction that contributes to turnover and makes the job of the "skill stealer" easy is the fact that workers often feel that they are not being treated very well. This outranks job security and compensation as a factor of discontent, although money has a potent voice for many workers. It can therefore be assumed that a basic factor in employee turnover, and one too often overlooked, is company policy. So, in searching for the reason for labor turnover, the place to begin the search is with the company policy as far as it concerns recognition of the individual; in other words, the way the men were treated.

Business has gone a long way toward better employee relations. Some young people entering business today could scarcely believe the difference in attitude toward employees and the general attitude which prevailed at the time their fathers went to work. The further back we go the more hard-boiled became the relations between employer and employee. Modern improvements in conditions for working people are little short of wondrous to the average working man of 60 years or thereabouts. Today's safety precautions, clean work areas, locker rooms, washrooms, sanitary low-priced employee cafeterias, overtime pay, paid

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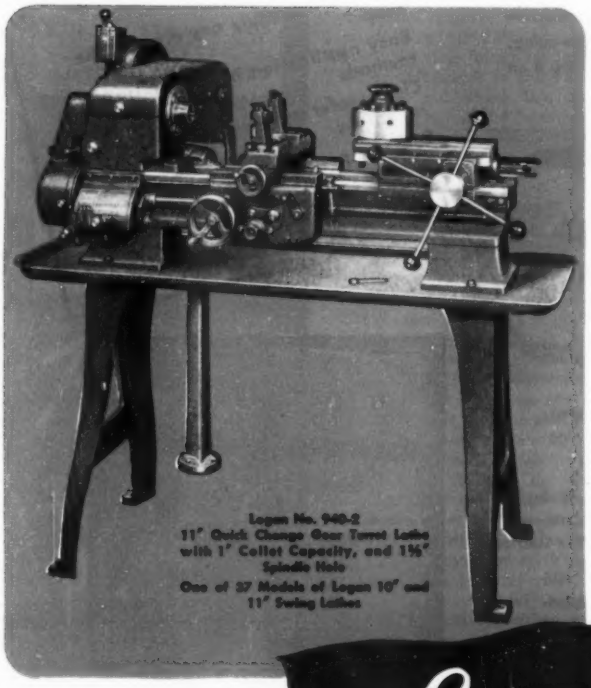

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11" Quick Change Gear Turret Lathe with 1" Collet Capacity, and 1⅝" Spindle Hole
One of 27 Models of Logan 10" and 11" Swing Lathes

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Less than .0005" spindle runout 12" from the bearing . . . two V-ways and two flat ways precision ground to within .0005" variation . . . these are typical Logan Lathe construction tolerances.

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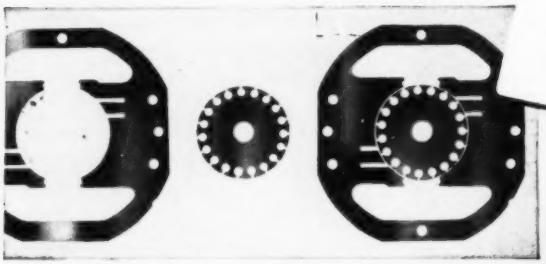
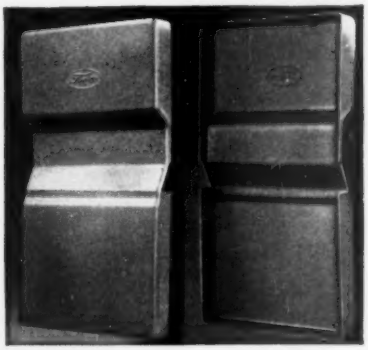
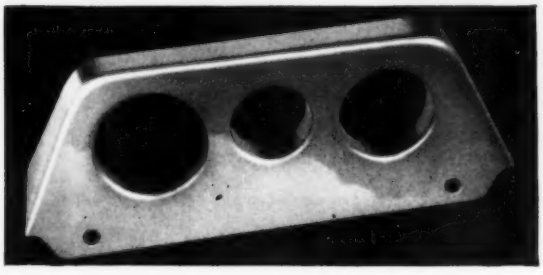


Above, Johnson's Wax Lubricant used for lamination stamping increased sets per die grind from 45,000 to 65,000.



Right, Car radio case of hot rolled steel—impossible to draw with common lubricants—perfect consecutive draws with Johnson's Wax Lubricant.

Below, Telephone coin receptacle of No. 405 stainless steel drawn with Johnson's Wax Lubricant. No perceptible tool wear after thousands of successive perfect draws.



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WRITE FOR CATALOG

vacations, bonus plans, insurance plans; practically all of them were exceptions of a few years back, rather than common practice as most of them are today. What we must remember is that these things are taken for granted today. They are no longer looked upon as something special, but as the just dues of employees. But in spite of these benefits to employees, the problem of reducing the "quit rate" or turnover still exists. Only top management can enunciate certain policies which have a big influence on the turnover rate.

A potent cause for turnover is friction between employees and their supervisors. Under normal conditions more men quit because they don't like their foreman, or because the foreman doesn't like them, than for any other reason. No matter how much training is given foremen, certain personalities always clash. Shop discipline requires that the foremen must have the authority to fire a man, but it is becoming the rule to set up safeguards to make sure foremen do not abuse this authority. Some check on the foreman's right to fire those under his supervision is desirable, not only because a worker is entitled to a hearing before he is discharged for cause, but also because it costs the company money to hire and train the new men to replace those who are fired.

Labor stealing is symptomatic of the whole question of labor turnover. The causes that induce labor turnover offer fertile grounds for labor stealing. How they can be prevented requires the careful attention of all employers. Perhaps the greatest mistake made by the average company is to set up certain rules, to establish certain policies, and then assume the attitude that employee relations are on a high plane and labor turnover will be no longer a problem. Because it has been decreed that no employee can be fired, except when charges are preferred and considered by impartial committees; because the toilets are clean; because the employees have a place to park their cars; neither these nor a hundred other similar things are enough to guarantee good employee relations and to insure a low turnover. Even when all these undeniable advantages are enjoyed, the turnover problem is always present, and will always come under the head of unfinished business. It is something that requires day-to-day adjustment and day-to-day realignment, with continued observation to watch any change in levels. Consider the turnover problem like maintaining per-

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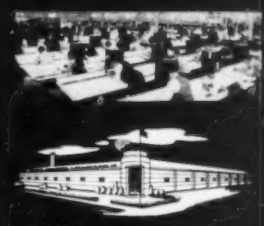

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sonal appearance; a matter for constant care, and one which requires immediate attention to the smallest detail.

Harry Kaufman
Philadelphia, Pa.

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BARGAIN SHOPPER

WHEN THE DEMAND for labor exceeds the normal supply, the old problem of where the needed manpower is to be found always comes. With this condition comes the messy business of hiring other companies' employees. Personnel departments are faced with determining how to walk the tightrope without falling off. Company policy has much to do with these conditions, as do working conditions within a shop.

Many times we see shops which have no trouble obtaining employees regardless of existing outside conditions. Ever stop to think why? Ever compare that shop with your own? Do you handle your labor the same as they do? Do you have the same overall policy? How about your wage structure? Many things enter into the picture. Things which too many top management personnel forget about or do not care to think constructively about.

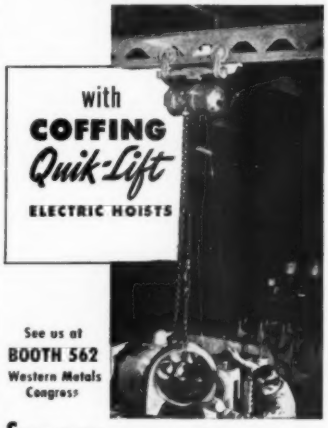
In times of labor surplus, nothing much matters. A man must work for a living. He takes a job and holds on with grim death. He is afraid to go out looking for something new. He does not like the working conditions or the wages but still he must stay on the job because he needs the work. If he tries for a new position and fails, he may lose his present job and be out of work. So he stays. No, he's not loyal to his company—but why should he be? The company is noted for a low wage scale and poor shop conditions. They are like so many companies that think labor is a machine and does not need to be thought about except when the issue is forced by the unions.

Now these men when the labor market becomes scarce see a chance to better themselves. A chance to get ahead and to expand and make a job change. They are no longer tied because they know the demand is great enough for skilled labor to find a job somewhere.

So as we review this problem of whether the hiring of employees who are looking for a new position when still employed is labor stealing, we see that much of the trouble lays with management. How can we correct it. Can we stop it? Do we want to stop it?

First, the only way that we can

Reduce the high cost of aching backs



STRAINED backs and hernias—injuries traced directly to heavy lifting — are the most common, the most costly of industrial hazards.

In Illinois, almost a million dollars was paid out in compensation for these injuries alone during 1948 . . . New Jersey and Pennsylvania averaged about four back injuries per working hour. Other industrial states had similar records.

What can be done to reduce this tremendous toll? The installation of Coffing Quik-Lift Electric Hoists is a big cost-saving step in the right direction. These hoists move loads up to two tons easily, *safely* at the mere flick of a switch. All load holding parts are tested at 100 percent overload to assure fullest protection to men and materials . . . shoe-type brakes cannot slip or drop load . . . fool-proof switch stops hoist when hook reaches upper or lower limit.

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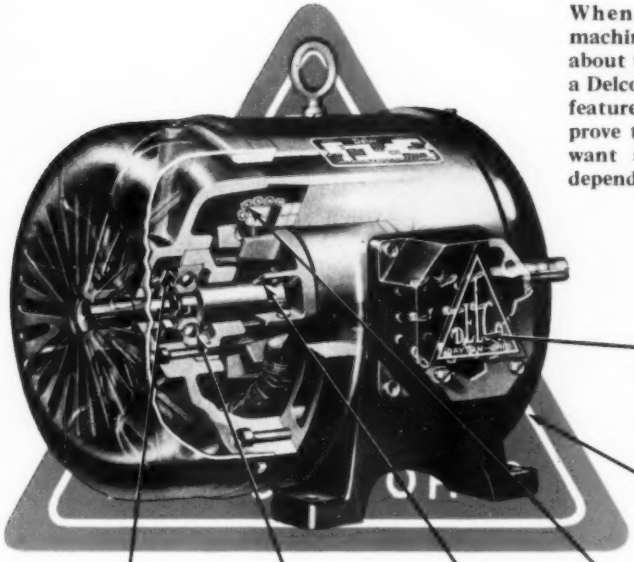
When you invest in new production machinery, it pays to be just as particular about the motor that drives it. Look inside a Delco Motor. You'll see extra engineering features, extra care in construction, that prove to you a Delco is built the way you want a motor built. Specify Delco for dependable power day in, day out.



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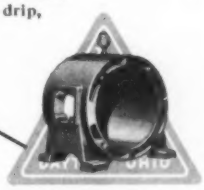

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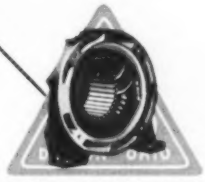

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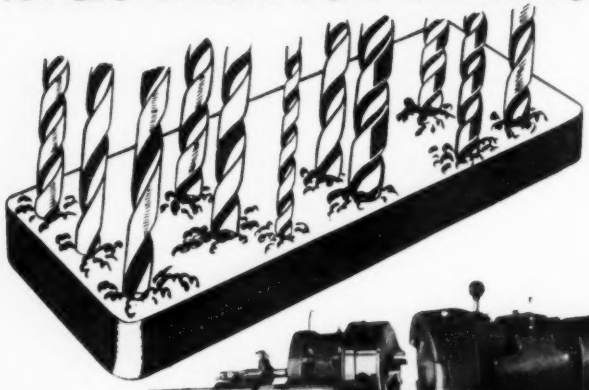

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control this type of condition is for a standardized wage policy based on job evaluation be established by areas. Proper job descriptions written and properly scaled wage brackets for the work must be set up. Each company then could be governed by these rules. A man would gain nothing in salary or wage compensation in changing companies for the same type of work. His wage scale must have a fixed meaning. He would know that his friend working in X company on the same job as he was in Y company was getting the same range of pay.

This would not stop the labor turnover or the desire to change positions or in some instances the desire to swap job for job. Other conditions enter into that. Supervision and working conditions are the two most general facts that will cause men to seek new working locations. These are controllable only within an individual company organization.

Do we want to stop a man from seeking a new position when he is still working? Do you want to be frozen on your job? Think a moment before you decide. Remember that "for life" is a long time. Remember this would mean no looking for a new connection until you quit or resigned your present position. No, I don't believe we want to stop any man from trying to advance or to earn more money. Things being equal, most employees don't change jobs unless they have reached a point of stagnation within a certain company. Usually they are willing to work it out with the company if the company so desires. Most companies fail in this point. They give the employee the brush-off and thereby the

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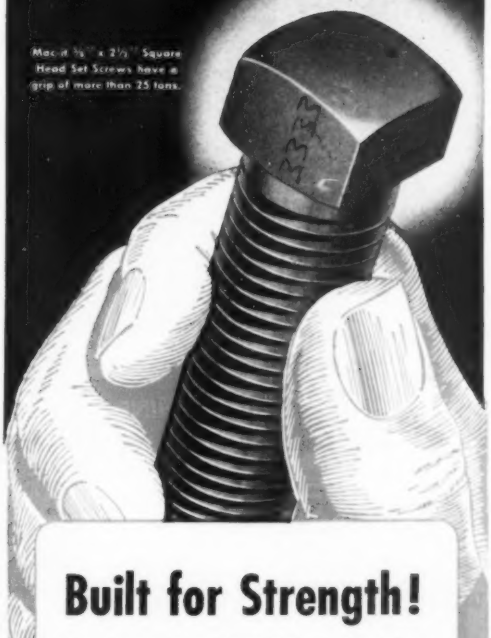

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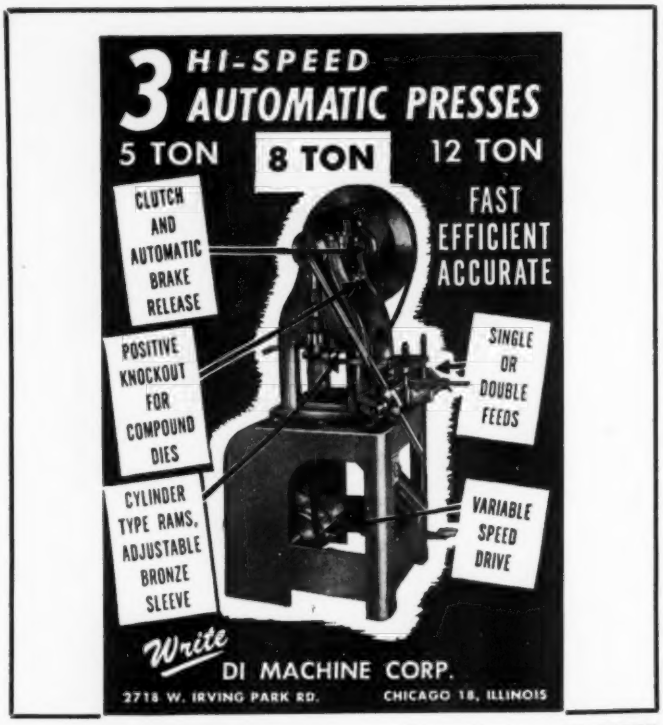
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company itself starts a man's search for a new position.

This is not always the case, but let us say that to condemn or to condone the practice of labor stealing as presented by Al can not be done by saying it should or should not be carried on. Company policy, labor conditions, working conditions, living conditions in a community, supervision and many other factors enter into the problem. Let us say, however, that if a company policy is to always keep or pay wages just above everyone else's in the area in order to induce men away from their normal work, this practice should not be condoned. This is bad business on the part of the company and can cause many hardships on both labor and company management.

Charles D. Townsend
West Hartford, Conn.

•

Whenever there are two or more manufacturing establishments in the same part of the country, there is competition between them to get the best and most skillful men.

Many have been the ruses and other kinds of actions by firms in order to get trained men to leave one plant and enter another (theirs).

An enticement might be an increase in wages, better working conditions or other reasons.

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Many times it had been a case where ethics and fair play have been cast to the ash can and "dog eat dog" was the moving spirit of the day.

In a town in Michigan, there was a manufacturers' association. At the home office of the association, every employee in any member plant was listed.

The consequence was that a man who left one plant could not gain employment at any other member plant.

This relation lasted two years, then the war came on and all employees made free to go where the circumstances and wages were the most suitable. The largest plant gained many applications and took on all of the men they could use.

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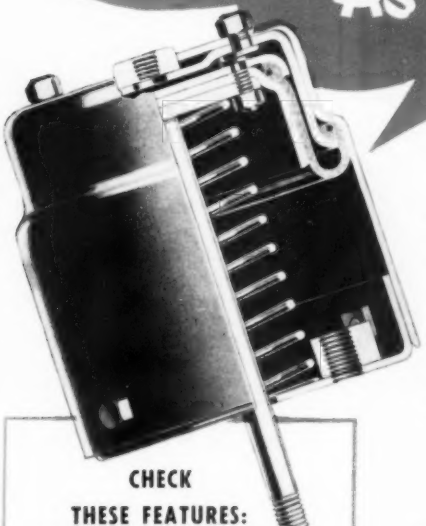

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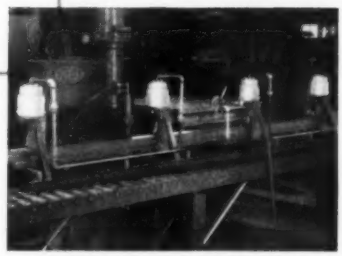
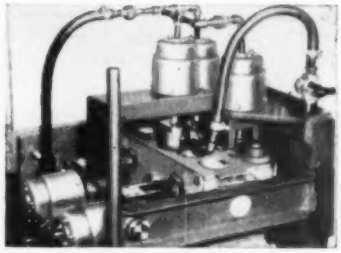


REDUCES OPERATOR FATIGUE

Four Rotochambers installed on the fixture in this spot welding operation replaced cumbersome hand clamps, saving time, greatly reducing operator fatigue.

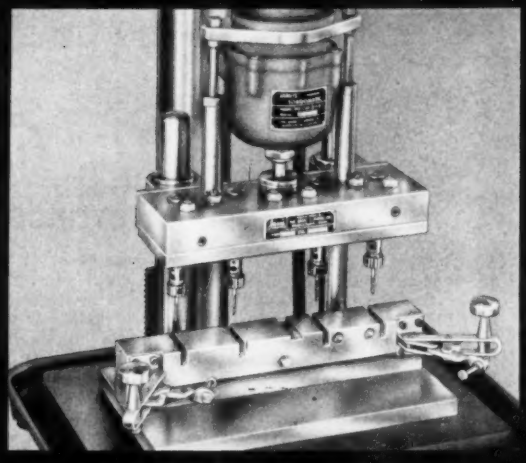


SPEEDS INSPECTION METHODS

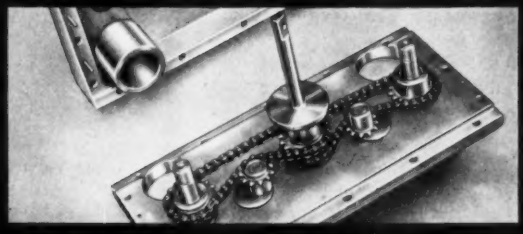
Installation of Rotochambers on this water test operation for engine castings eliminated hand operated fixtures, thereby speeding inspection and cutting costs.

Jarvis

MULTI-TAPPERS



teamed with the Jarvis Torqomatic tapping attachment and Jarvis Tecni-Taps provide superior packaged power, packaged performance, unequalled anywhere, used everywhere.



Silent roller chain transmits positive power from Torqomatic drive unit to spindles. Withstands friction, absorbs shock, assures low maintenance.

Write for folders on the Jarvis precision tapping package. Compare Jarvis with any other similar power tools. You'll team up with Jarvis.

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FLEXIBLE SHAFTS and
QUICK CHANGE CHUCKS and COLLETS

THE CHARLES L. JARVIS CO., MIDDLETOWN IN CONNECTICUT

cases where men have in many cases made changes by shopping around and these changes have caused them to be happy and contented.

Many bargain shoppers are regular itinerants and they seem to be the best mechanics in their various lines.

It is better for a man to have an apparent future than it is to quit first and then look for the job but many firms have suffered thereby because they have lost many specialists in particular lines of operation.

F. H. Stebbins
Worcester, N. Y.

•

TURNABOUT

It is certainly practical for a new worker to look over the shop he is going to work in, also his possible boss. He knows he is going to spend up to 10 hours each day in the shop and will have his boss supervise him 8 or 9 hours each day, and it is essential to find out before starting what kind of a man he will have to take orders from, what characteristics his boss has, also what kind of men he will have to work with; the kind of work he will have to do, the machinery and conditions in the shop. It is better to look things over before starting the job, than to take the job and then quit.

Now the attitude of Ed that men are hired to work for him is positively wrong. He—Ed—is put on the job in order to work with his men and train his men to work *with* him, not *for* him. It is quite different if a man is working *for* you, or *with* you. When a man works for you he is there to do what you tell him to do and no more. He should appreciate the new applicant, and come down and look him over and get acquainted with him to see how well he is getting along. He should realize that the man has foresight and wisdom and ingenuity and he should discover this *before*, not *after*, he gets the job.

Ed should see the man and see if he is suited for the job. If the man is hired, then Ed finds that the man is not suited for the job, Ed would have to let the man go or be transferred to another department. The other way is much simpler and it would save a lot of time.

In our place, I insist that before a man is sent to work with me I want to interview him to find out what he is capable of doing, what are his views on certain points, can I teach him things, is he the type that will respond to new ideas, or is he the type that is set in his ways. I have sent many men back and they are placed in different departments and

we are good friends because we understand each other. There is no animosity between us.

Personality conflicts will happen so why not thrash things out beforehand? The time when foremen were slave drivers is over and it is a good thing, because it did not do any good for either management or labor. Ed, for instance wants the man to work for him; he will give him a job and tell him what to do and how to do it. The man will not be able to improve it. That is the way with many men, and they stay that way. Wake up, Ed. We are now in the 20th century.

We realize that we work as a team, top management, foremen and men in the shop; that is why no one can do it by themselves. As a team it is accomplished. Keep that in mind, my dear Ed, try it and you will see what I mean.

Michael Axler
Bronx, N. Y.

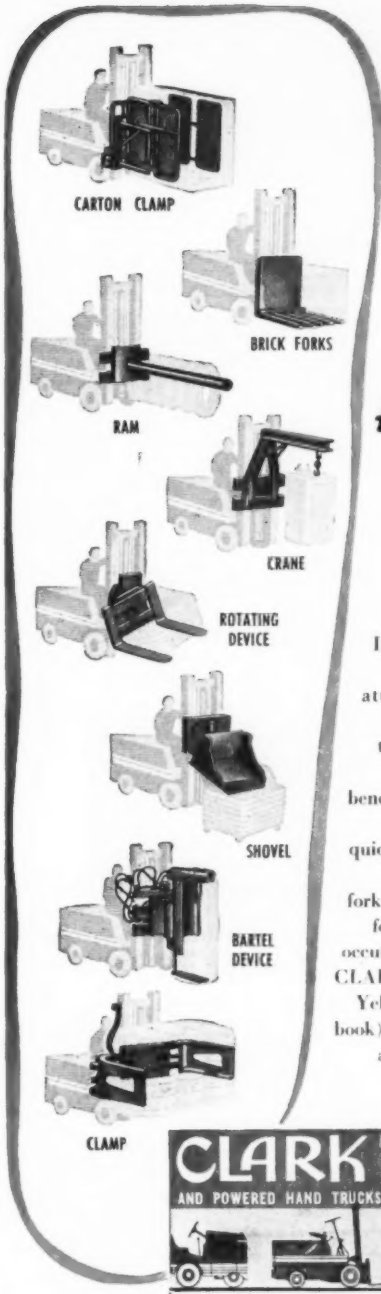
•

OFF AGAIN, ON AGAIN

The traits of an individual are generally sufficiently apparent so that after a short interview one can at least partly classify the person. For it is from such casual observances that one can glean the basic knowledge of the man's background, whether he may become a sloppy worker or if he is the other extreme . . . one who must stay so clean that his work will reflect that trait. You are able to get an idea of his boastfulness or his shyness. While these things do not tell anything tangible about his work performance, they are signposts . . . they are caution signs and even in some cases they become stop signs.

Other extremes in personal attitudes may reflect working traits also. Caution must be exercised, however, by the foreman who judges workers' ability on these traits alone. Oftentimes a man will in an interview show up well bu' he will lack training in his field or in the field he is endeavoring to enter. Or a man may appear poorly in an interview and give no true indication of the extent of his knowledge or ability.

It is not an easy job to judge individuals on a first interview. It is almost impossible to actually know how the man may react in a shop if you have only casually talked to him under ideal conditions. Yet a foreman who has been properly trained to do his job of judging employees which he must either hire or pass by, can frequently get sufficient clues as to the man's indi-



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viduality and be able to judge him accurately as a future worker.

The starting of a man on easy jobs allows him to learn the shop without help. It may relieve the foreman of some of his responsibility which he so much likes to get rid of when he hires new employees, that of training employees.

It is often possible to start well-adjusted men on jobs requiring more skill or knowledge of machine operations. They are cautious in nature and have pride in doing the job well.

It will not take long for the foreman to judge his new employee after he starts work. As a good sound principle which has paid off in successful shops, the starting of an employee on easy jobs has its merits.

It allows the new employee a chance to become acquainted, it gives the busy foreman time to properly educate his new employee in shop policy, it saves machines and tools, a foreman can better judge a man's worth as a worker after a job or two, and it saves employees.

It is not advisable under any condition to start a new employee on the most critical job in the shop. Remember always the first job for a worker in new surroundings makes him nervous. He is being watched by the foreman and his fellow-workers. All are eying him and he may not be able to produce well under this type of strain. Don't handicap your employee by placing work on him that under normal conditions requires careful and concentrated thought. He probably will fail you and either wreck the machine or break the tool. This does not indicate that he can not do the work. It merely shows that under a nervous strain a human being frequently can not co-ordinate mind and muscle. Never leave a new employee on his own until you have carefully oriented him to the surroundings and the plant policy. This is part of the work that any good foreman must do. Had this been done and had Ed studied his man the master spring tool would not have been broken.

Charles D. Townsend
New Hartford, Conn.

•

Hiring a new man should entail a certain procedure, first put the man at ease. Introduce him to the men he will have to work with. Find out what he can do, what kind of a man he is, what experience he has; is he familiar with tools, can he operate the machine that you want him to. Give him a job. Analyze the job with him, instruct him step by step, list

all known points in each step, let him repeat to you what he is going to do. If there is any danger point explain it to the man, give him the job and watch him do it. If he dose not do the job as told, correct him and watch again how he is getting along.

Everybody wants security, recognition, friendship and a feeling of importance, but the special problem of individuals makes it necessary for the foreman or supervisor to know his workers as individuals; their temperaments, likes and dislikes and special problems. Knowing them as persons helps him.

Careful job training, close supervision, explanation of why things must be done in a clean-cut fashion will make a new man do a job properly. Cooperation can be expected from people who are treated like individuals. A good working relationship between the foreman and his people depends largely on good job training and recognition for work.

My dear Ed, it is foolish to expect a man who is new to everything in the shop to do a good job. You must have forgotten how you yourself felt when you came to a new place. If you take a new man and fire him because he broke that master spring tool, you are no good. He was not to blame; you were. Furthermore, the men under you will not respect you. You're like some of the foremen I used to know. I just did as little work as I could get away without being fired. Every man under that foreman didn't do a thing to help him because he did not deserve any help; it looks to me friend Ed, that you are of the same type.

Michael Axler
Bronx, N. Y.

"You just ring up the mechanical brain—tell it exactly what's wanted, feed the bar stock and let 'er go—"

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4 WAYS TO SAVE TIME

in Production and Maintenance

On the basis of their time-saving records, leading shops are increasingly standardizing on these 4 Nicholson units. For details, send for the individual bulletins listed here.

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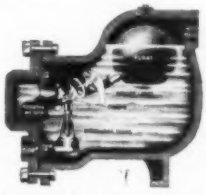

NICHOLSON ARBOR PRESSES—A ready, precision tool for bending, pressing, assembling, broaching, etc. 5 sizes: for 5¾" to 20" diam.; light to 5-ton capacity. Bulletin 845.

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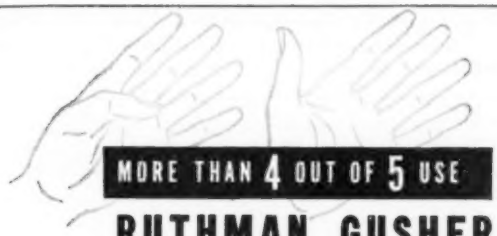

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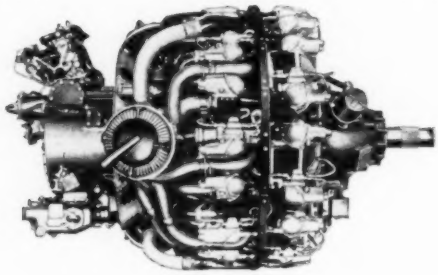

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Office of Small Business Gets OK To Parcel Out Subcontracts

WASHINGTON—After a long fight by the small-business bloc, the Senate has written a "Small Defense Plants Administration" into its extension of the defense-production act, and the House has called a similar agency a "Corporation." This gives the new version of World-War-II's Smaller War Plants Corp. the authority to:

Take prime military contracts and parcel out smaller subcontracts.

Finance operations of small outfits, pay for research, buy equipment and materials.

Make a nation-wide inventory of small-plant capacity.

Sit in on order-issuing agencies to check contract distribution, and to make sure small subcontractors and pools get their fair share of defense orders.

Require suppliers to furnish information on materials allocations.

Although the office's operation may be inefficient as compared to one large company, the idea should easily improve production and even out the war load. As an example, the Omaha Industries 100-company "combine" that operated during the war took 65 prime contracts totaling $15 million; but only after the original small-plants agency was created.

Two current pools have been cleared with NPA, the Defense Dep't, and the Department of Justice; and thus may operate under SDPA—Omaha Industries, and Coordinated Mfrs of Santa Clara County, San Jose, Calif. The Greater New York Pool is about set for clearance, too.

Still in the works are: The 20-member Peoria Consolidated Mfrs., Inc., and the 30-firm Central California War Industries, Inc. These, except the Peoria group, are revivals of war-time groups.

Compared to big business, subcontracting pools are small potatoes; but to the small plants themselves, they are important—and they are actually worth the trouble. During the war, 250 pools got government clearance and produced $600 million worth of defense goods. This compares to $200 billion produced through prime contracts by major companies.

Probable procedure of SDPA will be to locate field agents to keep track of subcontractors and how they are doing, and liaison officers in all government procurement offices to keep their eyes on contracts. If they can prove capacity and ability to produce, they will probably be able to take nearly any contract they choose.

Almost every Washington mobilization office now has a small-business office, and these may be tied in with Small Defense Plants Administration, or whatever name the final agency is given. Up to now, about all small business has had was official statements of policy, but the Senate and House bills should span the gap between non-productive statements and actual contract placements by procurement officers who really make the decisions as to which plants get the orders at what price.

All-Weather Turbojet Contract Split Among GE, Studebaker, Packard

SCHENECTADY, N. Y.—Large-scale production of "—23" model of the J-47, announced by General Electric, Studebaker, and Packard, will spread subcontracts and supply orders throughout the 48 states. GE, who will produce the new model at Lynn and Everett, Mass., and Lockland, Ohio, plants, and who will begin making J-47 dies at a 50,000-sq-ft plant leased from Ludlow Industries, Inc., Ludlow, Vt., will receive subassemblies and components from over 1000 subcontractors and other GE plants. This compares with only 250 subcontractors who supplied for the first J-47 model. GE will move executive, engineering, and commercial offices from downtown Boston to Lockland, where additional space has been leased.

Studebaker will utilize parts of its South Bend plants, plus the new shop at New Brunswick, N.J., for production under a licensing agreement with GE. Continued production of civilian cars and trucks and military trucks is planned.

Packard, working under a similar license, will build the "—23" at a new 700,900-sq-ft, one-story plant at Utica, Mich., on which construction has started. The order is one of Detroit's largest to date with the AF.

The "—23" model is rated at over 5800 lb thrust, has lower fuel consumption than the earlier model, and has a special ignition system to allow starting at high altitudes. The engine is exclusively for the Boeing B-47. Other models of the J-47, to be produced by GE, will power the North American F-86 and the Convair B-36.

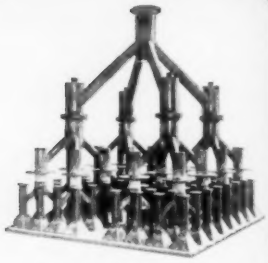
GMC Division Building Jet Engines, Searches for Subcontractors

KANSAS CITY, Kansas—The Buick-Oldsmobile-Pontiac assembly division of General Motors Corp. is in search of subcontractors for the F-84F jet engines it will turn out in the former North American Aviation plant of World War II.

Subcontractors are sought for various stampings, mechanical and hydraulic units, and other components including: Tail pipes, ailerons, flaps, pilot seats, rocket adapters, oil tanks, fuel tanks, engine accessories, pneumatic assemblies, power controls, lubrication systems, and others. Quantities at this time are not large. Later on, subcontracts will be awarded for small mechanical and electrical assemblies.

Firms wishing to bid should write for information on quantities required and for the procedure to follow in submitting quotations. The letters should make the company manufacturing capabilities clear, and should be directed to C. C. Brandon, director of purchases, at the factory.

Steel-Weld FABRICATION



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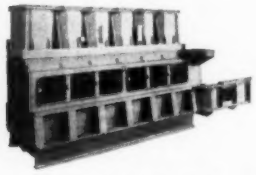
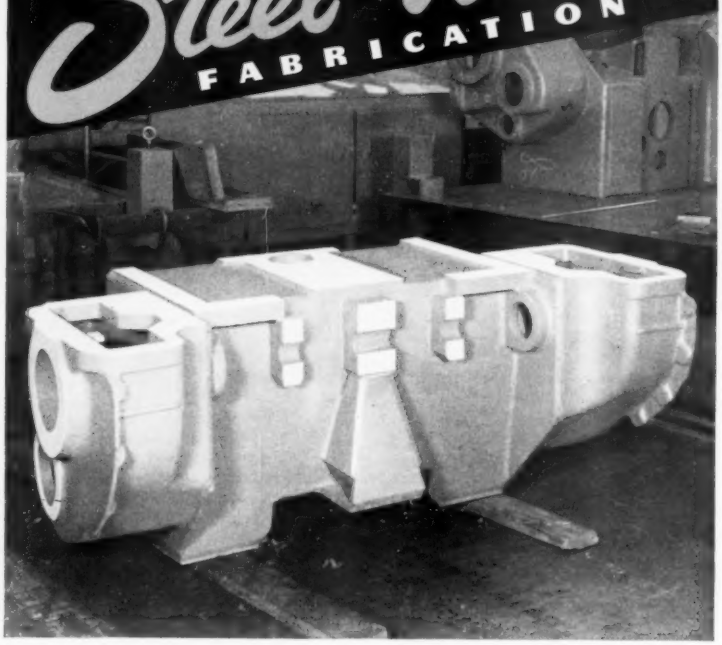


Diesel Engine Crank Cases and Frames for the Marine and Electro-Motive Field.

Crank Cases, Frames, and other Parts for Manufacturers of Marine Steam Engines of Uniflow or Multiple Expansion Type.



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Fruehauf Trailer Co., Ft. Wayne, Ind.—semi-trailer, cargo.

Worden Specialty Co., Plymouth, Mich.—cap, wheel track.

Trailmobile Co., Cincinnati—spare parts, semi-trailer suspension bearing; 6-ton semi-trailer.

Willys Overland Motors, Inc., Toledo—truck, cab closure; cargo truck.

A. J. Miller Co. Bellefontaine, Ohio—ambulance, ¾-ton.

Griffin Engineering Co., Worthington, Ind.—periscope housing.

National Farm Machinery, Shelbyville, Ind.—cabinet, bench.

Biederman Motors Corp., Cincinnati—gaskets, gears, drums.

Allis-Chalmers Mfg. Co., Milwaukee—differential assembly.

Link-Belt Co., Detroit—drive track sprocket.

General Eng. & Design Co., Detroit—track brackets.

Michigana Products Corp., Michigan City, Ind.—fuel tanks.

Federal Motor Truck Co., Detroit—crankshaft, engine.

Bear Mfg. Co., Rock Island, Ill.—wheel alignment indicator.

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Monroe Auto Equipment Co., Monroe, Mich.—repair kits.

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Neff Equipment Co., Toledo—voltage regulator.

Cherry-Burrell Corp., Cedar Rapids, Iowa—exhaust pipe assembly.

Twin-Disc Clutch Co., Rockford, Ill.—torque converter assembly, clutch.

Modine Mfg. Co., Racine, Wis.—radiator, transmission oil cooler.

Monroe Auto Equipment Co., Monroe, Mich.—suspension bearing.

Borg-Warner Corp., Detroit—oil cooler.

Kenworth Motor Truck Corp. Seattle, Wash.—repair kit, propeller shaft.

Briggs & Stratton Corp., Milwaukee—filters, mufflers.

Scintilla Magneto Div., Bendix Aviation Corp., Sidney, N.Y.—receptacles, gaskets.

Buick Motor Div., GMC, Detroit—automobile sedan, 5 passenger.

Premier Industries Corp., Monroe, Mich.—brake assembly shoe.

Sav-Way Sava Seal, Inc., Detroit—shaft control, steering lever.

Fargo Motor Corp. Div., Chrysler Corp., Detroit—pick-up truck, one-ton.

Truck & Coach Div., GMC, Pontiac, Mich.—stake truck.

Linn Coach & Truck Div., Great American Industries, Inc., Onesonta, N.Y.—cargo trailer, ¾-ton.

Truck & Coach Div., GMC, Pontiac, Mich.—rod, socket, spacers, braces, 5 ton truck tractor.

Division Tool Co., Wyandotte, Mich.—lever, steering brake.

Cadillac Motor Car Div., GMC, Detroit—guns, twin 40-mm.

Round California Chain Co., S. San Francisco, Calif.—chain, tow.

International Harvester Co., Washington—truck tractor, 5 ton, diesel.

Electric Auto-Lite Co., Toledo—regulator, generator, starter assembly.

Triplex Corp. of America, Pueblo, Colo.—piston with pin assembly.

White Motor Co., Cleveland—radiator shroud assembly.

Westinghouse Electric Corp., Detroit—electric arc welder.

New York Ordnance District

Allen B. Dulient Labs, Inc., Clifton, N. J.—temperature-recording system.

Camburn, Inc., L. I. City, N. Y.—automotive supplies.

Homelite Corp., Portchester, N. Y.—automotive supplies.

Los Angeles Ordnance District

Clary Multiplier Corp., San Gabriel, Calif.—boosters.

Mattel, Inc., Culver City, Calif.—automotive spare parts.

Springfield Ordnance District

Kalart Co., Inc., Plainville, Conn.—elbow, telescope.

Colt's Mfg. Co., Hartford, Conn.—revolver, aircrewman.

Winchester Repeating Arms Co., New Haven, Conn.—barrel assembly for carbine.

Frankford Arsenal, Philadelphia

Grote Mfg. Co., Inc., Bellevue, Ky.—reflex sight and special tooling.

General Industries, Inc., Philadelphia—drop test tower.

Machinery Associates, Inc., Philadelphia,—lathes.

Watervliet Arsenal, N. Y.

Fallkill Machine Co., Inc., Poughkeepsie, N. Y.—cannon parts.

Machine Products Co., Houston, Texas—cannon parts.

Redco Tool, Div. of Red Lion Cabinet Co., Red Lion, Pa.—cannon parts.

Sandy Hill Iron & Brass Works, Hudson Falls, N. Y.—cannon parts.

Hexagon Tool & Eng. Corp., Dearborn, Mich.—cannon parts.

Consolidated Machine Tool Corp., Rochester, N. Y.,—lathes.

Premier Textile Machinery Co., Inc., Jersey City, N. J.—cannon parts.

Chicago Ordnance District

Badger Meter Mfg. Co., Milwaukee,—fuze.

Cline Electric Mfg. Co., Chicago—spare parts.

Ecko Products, Chicago—cartridge cases.

Wisconsin Motor Corp., Milwaukee—engine generators.

ARMY ENGINEERS AWARDS

Chicago Procurement Office

M-R-S. Mfg. Co., Flora, Miss.—tractors and trailers.

Minneapolis-Moline Co., Minneapolis, Minn.—tractors.

Wooldridge Mfg. Co., Sunnyvale, Calif.—wheeled tractor.

Wall Mfg. Co., Winston-Salem, N. C.—coal trucks.

Baughman Co., Jerseyville, Ill.—coal trucks.

Sterling Eng. & Mfg. Co., Wilkes-Barre, Pa.—earth augers.

Caterpillar Tractor Co., Peoria, Ill.—crawler tractors, spare parts.

J. I. Case Co., Racine, Wis.—tractors.

R. G. LeTourneau, Inc., Peoria, Ill.—road scrapers.

American Tractor Eqpt. Co., Oakland, Calif.—road scrapers, bucket loaders.

International Harvester Co., Melrose Park, Ill.—crawler tractors, rubberwheel tractors.

Athey Products, Chicago—crawler wagons.

Frank C. Hough Co., Libertyville, Ill.—loaders.

Jacques Power & Saw Co., Denison, Tex.—utility winch.

Little Giant Tree Feller Corp., Dallas, Tex.—sawpower unit tractors.

Gledhill Rd. Machy. Co., Galion, Ohio—snow plows.

Electric Wheel Co., Quincy, Ill.—trailers.

Ottawa Steel Prod. Co., Ottawa, Kan.—bucket loaders.

E. D. Etnyre & Co., Oregon, Ill.—distributors.

W. E. Grance Mfg. Co., Dallas, Tex.—spreaders, aggregate.

Clyde Iron Works, Inc., Duluth, Minn.—pile driver, lead.

Bay City Shovels, Inc., Bay City, Mich.—cranes.

Pettibone-Mulliken, Chicago — excavators leaders.

Link-Belt Speeder Corp., Cedar Rapids, Iowa—cranes.

Le Roi Co., Milwaukee—compressors.

Barber-Greene Co., Aurora, Ill.—mixing units, gradation control unit.

Johnson Service Co., Milwaukee—compressors.

A. B. Farquhar Co., York, Pa.—conveyors

Ingersoll-Rand Co., Chicago—quarry equipment, spare parts.

Yates-American Machine Co., Beloit, Wis.—lathes.

Trackson Co., Milwaukee—spare parts.

Nova Engine Co., Lansing, Mich.—spare parts.

Daybrook Hydraulic Corp., Bowling Green, Ohio—spare parts.

Quincy Compressor Co., Quincy, Mass.—spare parts.

Rollway Bearing Co., Syracuse, N. Y.—spare parts .

United Service Div., GMC, Detroit—spare parts.

Detroit Diesel Engine Div., Detroit—spare parts.

Philadelphia Procurement Office

Gray & Dudley Co., Nashville, Tenn.—stoves and spare parts.

The Hobart Bros. Co., Troy, Ohio—welding equipment.

York Corp., Philadelphia—Ice plant, 15 tons, equipment only.

Frick Co., Waynesboro, Pa.—Ice plant, 3.6 tons, equipment only.

Union Stove Works, Inc., New York—stoves and spare parts.

Hardes Forge & Foundry Co., Lawrenceburg, Ind.—pump, turbine.

Cornell-Dubilier Electric Corp., Indianapolis—spare parts.

Nordberg Mfg. Co., Milwaukee—track shifter.

International Fremont Machinery Co., Inc., Ramapo, N. Y.—generator sets, 50 Kw.

Consolidated Diesel Electric Corp., Stamford, Conn.—generator sets, 60 Kw.

General Fire Truck Co., Detroit—truck, fire, 750 GPM.

John R. Hollingsworth, Clifton Heights, Pa.—generator sets 3 Kw.

New York District Engineer

Carl Buhr, Inc., New York—construction project.

W & L. E. Gurley, Troy, N.Y.—spare parts, Gurley instruments.

Pittsburgh District Engineers

Dewey Bros. Inc., Goldsboro, N.C.—18-ton saddle, knockdown.

Commercial Shearing and Stamping Co., Youngstown, Ohio—belts, bracing.

Ohio Machine Products Inc., Columbus, Ohio—bearer, footwalk.

Ceco Steel Products Co., Chicago—Bailey bridge erection equipment.

(Continued on page 219)

CAN YOU USE THIS EXPERIENCE?

LYON PRODUCED 20,000 CARLOADS OF SHEET METAL SUBCONTRACT ITEMS DURING WORLD WAR II

Write or Wire for LYON'S DEFENSE PRODUCTION BROCHURE

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LYON

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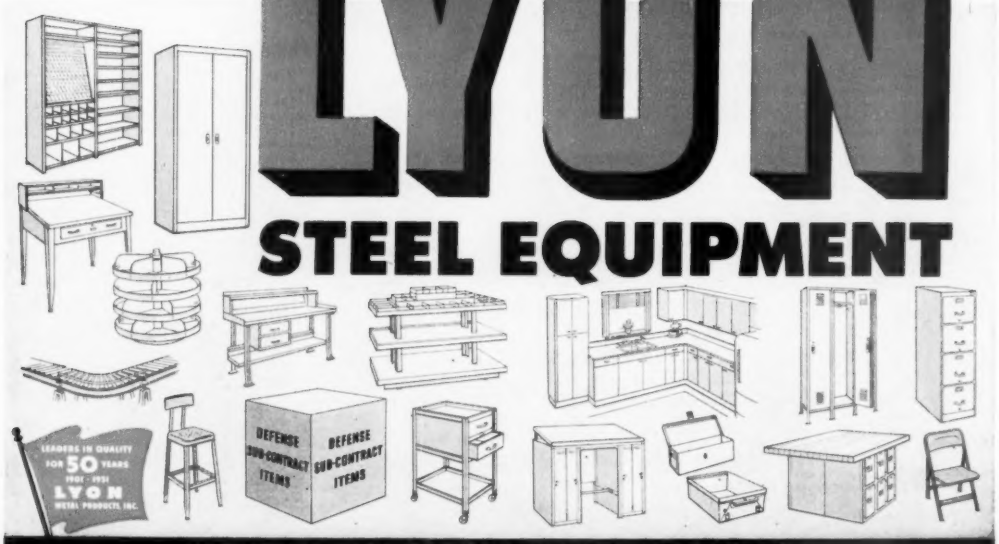

A PARTIAL LIST OF LYON STANDARD PRODUCTS

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- Lockers
- Stools
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- Cabinet Benches
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- Welding Benches
- Conveyors
- Bar Racks
- Tool Boxes
- Parts Cases
- Economy Locker Racks
- Flat Drawer Files
- Tool Room Equipment
- Wood Working Benches
- Display Equipment
- Drawing Tables
- Revolving Bins
- Hanging Cabinets
- Filing Cabinets
- Folding Chairs
- Work Benches
- Bench Drawers
- Service Carts
- Sorting Files
- Drawer Units
- Hopper Bins
- Tool Stands
- Shop Boxes
- Tool Trays
- Shop Desks

SIGNAL CORPS AWARDS

Signal Corps Procurement Agency, Philadelphia

Caroled Co. Inc., New York—multimeter.
Radio City Products, New York—voltohmmilliameter.
Highway Trailer Co., Edgerton, Wis.—2½-ton truck, pole setter.
P. R. Mallory & Co., Inc., Indianapolis—vibrator, synch and non-synch telephone plugs.
Kellogg Switchboard & Supply Co., Chicago—telephone set, and switchboard.
Telectro Industries Corp., Long Island City, N.Y.—auxiliary interphone equipment.
Maspeth Telephone & Radio Corp., Brooklyn, N.Y.—reperforator, teletypewriter.
Weston Electrical Instrument Corp., Philadelphia—commercial Weston meters.
John Mack Industries, Inc., Chicago—remote control equipment.
David Bogen, Inc., New York—Public address set.
Mark Simpson Mfg. Co. Inc., Long Island City, N.Y.—public address set.
Soundscriber Corp., New Haven, Conn.—recording and reproducing machine.
Shalleross Mfg. Co., Collingdale, Pa.—transmission test set.
Howard Industries, Inc., Cyclohm Motor Corp. Div., Racine, Wis.—hand-driven generator.
Oak Mfg. Co., Chicago—vibrators.
Jacob Industries Sales Corp., New York—box machine.
Automatic Mfg. Corp., Newark, N.J.—control boxes.
Electromatic Mfg. Co., New York—control boxes.
North Electric Mfg. Co., Galion, Ohio—switchboards.
Molded Insulation Co., Philadelphia—connectors and plugs.
Ferrocraft, Inc., Tuckahoe, N.Y.—box assembly.
American Tiling Co. Inc., Philadelphia—wave meter test sets.
Geo. Voron & Co., Philadelphia—test sets.
General Development Corp., Elkton, Md.—control switchboard.
Henry Products Co., Brooklyn, N.Y.—antenna equipment.

New Chrysler Contract Calls For Large-scale Subcontracting

DETROIT — A new Chrysler Corp. contract to build, equip, and operate a 1,600,000 sq ft plant for the manufacture of jet engines will call for large-scale subcontracting.

When in production, this defense job will require about 6000 persons. Initial contract is in the amount of $91 million. The Department of the Navy will acquire land in Macomb County, just north of Detroit. The government will retain ownership of the plant to be erected at that site.

Actual details of subcontracting have not yet been determined. In charge of the plant as general manager is John Edward Brennan, chief production engineer of the Dodge Chicago aircraft engine plant during World War II, and since then on the staff of the operating manager of the Dodge Division.

NAVY AWARDS

Bureau of Ships Washington 25, D.C.

Pointer-Willamette Co., Portland, Oregon—closed lighters.
Albina Engine & Machine Works, Inc., Portland, Oregon—open lighters
Ingersoll Products Div., Borg-Warner Corp., Kalamazoo, Mich.—spare parts, landing vehicle.
Radio Frequency Laboratory, Inc., Boonton, N.J.—test tool set.
Esterline Angus Co., Inc., Indianapolis—recorder, milliammeter.
Federal Telephone and Radio Corp., Clifton, N.J.—field change kit.
National Electrical Machine Shops, Inc., Silver Springs, Md.— radio receivers.
Electronic Televisor Corp., Chicago—radio interferences research, electronic controls.
Kay Electric Co., Pinebrook, N. J.—fluorescent Morse generators.
David Gogen Co. Inc., New York—testing equipment, portable sonar.
Aurora Pump Co., New York—pumps.
National Forge Co. Inc., Newark, N.J.—submarine periscopes.
Continental Electric Co., Newark, N.J.—motor generators.
Allis-Chalmers Co., Washington—main circulating pump.
Joy Mfg. Co., New Philadelphia, Ohio—vaneaxial fan, oxygen generating plant.
Carrier Corp., New York—condensing unit.
Cyclothern Corp., Oswego, N.Y.—complete boiler.
Hercules Filter Corp., Paterson, N.J.—condensate filters.
Skagit Steel and Iron Works, Sedro-Woolley, Washington—electric winches.
Empire Switchboard Co., Inc., Brooklyn—mine sweeping control cabinets.
Hays Corp., Michigan City, Ind. — airflow meters.
Columbian Bronze Corp., Freeport, L.I., N.Y.—propeller blade assemblies.
Hertner Electric Co., Cleveland—motor generators.
I-T-E Circuit Breaker Co., Philadelphia—circuit breakers.
York Corp., York, Pa.—condensing unit.
Crocker-Wheeler Div., Elliot Co., Washington—motor generator.
Bogue Electric Mfg. Co., Paterson, N.J.—motor generator sets.
Star Kimble, Motor Div., Miehle Printing Press Mfg. Co., Bloomfield, N. J.—motor generators.
Electric Storage Battery Co., Philadelphia—submarine main storage elements.
Westinghouse Electric Corp., Washington, D.C.—submarine main storage elements, after generator and distribution switchboard, searchlights, turbines, main propulsion.
Wilson Snyder Mfg. Div., Oilwell Supply Co., Braddock, Pa.—pumps, cargo stripping.
Needham Mfg. Co., Needham Heights, Mass.—chain pendants.
Ward Leonard Electric Co., Mt. Vernon, N.J. individual cell tester.
Vickers Inc., Vickers Electric Div., St. Louis, Mo.—motor generators.
Sharples Corp., Philadelphia—diesel fuel oil purifier.
Ingersoll-Rand Co., Washington—circulating pumps.
Arthur D. Little Inc., Cambridge, Mass.—oxygen liquefier.
Stoddart Aircraft Radio Co., Hollywood, Calif.—test sets, radio.
Wilfred D. White & Sons, Inc., Boston—Sonar sounding set, portable.
Metal Sales Co., Seattle, Wash.—ammunition lockers.
Avondale Marine Ways, Inc., Westwego, La. open lighters.
Kyle & Co. Inc., Stockton, Calif.—open lighters.
Cleveland Diesel Engine Div., GMC, Cleveland, Ohio—vertical crankshaft, diesel engine.
Waterproof Electric Co., Burbank, Calif.—radio set.
American Type Founders, Inc., Washington—printing press offset.
Bettendorf Co., Bettendorf, Ia.—adapter cutters.
Leslie Co., Lyndhurst, N.Y.—Leslie pump.
Bussman Mfg. Co., St. Louis, Mo.—double fuseholder.
Fada Radio and Electric Co., Inc., Belleville, N.J.—oscillascope portable.
L. L. Constantine Co., Clifton, N.J.—crystal plating machine.
Bird Electronic Corp., Cleveland—UHF antenna.
Times Facsimile Corp., New York — converter.
General Electric Co., Washington—turbine blading.
C. H. Wheeler Mfg. Co., Philadelphia—tensioning winch.
Commercial Engineering Co., Washington—turbine blading.
Champion Machne Co., Joliet, Ill.—doughmixing machine.
Hycon Mfg. Co., Pasadena, Calif.—frequency power meters.
Bendix Radio Div., Bendix Aviation Corp., Towson, Md.—direction-finder equipment.
Devry Corp., Chicago—motion-picture projector, 35 mm.
Worthington Pump & Machinery Co., Harrison, N.J.—condensate pump.
Raytheon Mfg. Co., Waltham, Mass.—radar path finders.
Marbie-Card Electric Co., Gladstone, Mich.—motors armatures.
Magnacord, Inc., Chicago—recording mechanism amplifier.

Navy Purchasing Office, New York

Spitz Laboratories, Philadelphia — celestial identification trainer.
Teletronics Laboratory, Inc., Westbury, L.I., N.Y.—projection oscilloscope spare parts.
Baltinger Electric Co., New York—portable voltage tester.
Dellenbarger Machine Co., New York—target course generator, and spare parts.
Holtzer-Cabot Co., Boston, Mass.—ommeter resistance indicator.
Elevator Div., Westinghouse Electric Corp., New York, N.Y.—centerline elevator machinery and spare parts.

Navy Supply Depot Great Lakes, Ill.

Continental Electric Co., Newark, N.J.—meter assembly.
Serve Tek Products Co., Paterson, N.J.—motors.

Ships Parts Control Center, Mechanicsburg, Pa.

Mine Safety Appliance Co., Pittsburgh—breathing apparatus, spare parts.
Cummings Engine Co., Columbus, Ind.—diesel engine spare parts.
Westinghouse Electric Corp., Philadelphia—controls and meters: repair parts, turbine.
Cooper-Bessemer Corp., Mt. Vernon, Ohio—repair parts, diesel engines.

Navy Purchasing Office, Los Angeles

West Coast Electronics Co., Los Angeles—filter sets.
Baker Bros., Corp., Los Angeles—refrigerators.

Navy Purchasing Office San Francisco 5, Calif.

Oakland Machine Works, Oakland, Calif.—operating gear.
Poader & Best, Inc., Los Angeles, Calif.—cameras.

(Continued on next page)

Follow this section each issue for news about

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. . . plans of prime contractors

. . . plant expansion for defense

All the news to help you in subcontracting problems.

When it comes to production- come to Hartford Special

Production Increased 540% with the SUPER-SPACER

This high heat resistant alloy part for jet engines requires 90 equally spaced 9/32" holes. Former production was 1.25 pieces per man hour using a conventional dividing head and standard drill press.

The setup was changed to use a standard 8" Super-Spacer with a special holding fixture. Production has now jumped to 8 pieces per man hour. Have you looked into this production tool?

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Hartford Special also makes these production machines

AUTOMATIC DRILLING & TAPPING MACHINES

Automatic THREAD ROLLERS

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THE HARTFORD SPECIAL MACHINERY CO.
HARTFORD 12, CONNECTICUT

DEFENSE CONTRACTS... continued

Naval Construction Battalion Center, Port Hueneme, Calif.

United Motors Service Div., GMC, Detroit—automotive repair parts.
Westfall Automotive Tagline, Los Angeles, tag line winder.
Erie City Iron Works, Erie, Pa.—steam boilers.
Blaw-Knox Div., Pittsburgh, Pa.—concrete spreader.
C. F. Johnson Co., Champaigny, Ill.—clamshell bucket.
Prosperity Co. Inc., Syracuse, N.Y.—laundry tumbler.
Cleaver Brooks Co., Milwaukee—distillation units.

Quartermaster General (USMC) Washington 25, D.C.

J. D. Adams Mfg. Co., Indianapolis, Ind.—spare parts.
Sinsco, Houston, Texas—stiff-legged derricks.
Sun Electric Corp., Washington—testing equipment.
Emory Thompson Machine & Supply Co., New York—ice-cream plant, portable.
Consolidated Diesel Electric Corp., Stamford, Conn.—generators.

NAVY AVIATION AWARDS

Aviation Supply Office Philadelphia 11, Pa.

Schuttig & Co., Washington—tubing assy.
Rochester Products Div., GMC, Rochester, N. Y.—regulator assembly.
General Electric Co., Philadelphia—bearings, alternators, fuel systems.
Thompson Products, Inc., Cleveland—diaphragm assembly, relief valve.
Bendix Aviation Corp., Teterboro, N. J.—starter, jet engines.
Robertshaw Fulton Controls Co., Washington—valves, temperature regulating.
Eclipse-Pioneer Division, Bendix Aviation Corp., Teterboro, N. J.—maintenance parts, indicator assembly, oxygen.
Adel Division, General Metals Div. Burbank, Calif.—motor, fuel pump.

AIR FORCE AWARDS

Air Material Command, Wright-Patterson AF Base, Dayton

North American Aviation Co., Los Angeles, Calif.—aircraft kits.
Wilcox Electric Co., Kansas City, Mo.—aircraft antenna.
RCA Victor Div., Camden, N. J.—radio receiver transmitters, dynamotors.
Lockheed-Aircraft Corp., Burbank, Calif.—aircraft spare parts.
American Brass Co., American Metal Hose Branch, Waterbury, Conn.—aircraft ignition equipment, spare parts.
Douglas Aircraft Co., Santa Monica, Calif.—fire prevention kits, aircraft.
Dumont Aviation Co., Long Beach, Calif.—generator assemblies.
Lycoming Spencer Div., AVCO, Williamsport Pa.—power plant assemblies.
Ryan Aeronautical Co., San Diego, Calif.—machinery and equipment.
Wyman Gordon Co., Worcester, Mass.—machinery and equipment.
General Services Administration, New York—office furniture.
Marlin Rockwell Corp., Jamestown, N.Y.—aircraft ball bearings.
Delco Products Div., GMC, Dayton—machinery and equipment.
Herman Nelson Div., American Air Filter Co., Moline, Ill.—gasoline engine-driven blower.
Charles A. Chommedieu Co., Chicago—plating barrel.
I-T-E Circuit Breaker Co., Philadelphia—machinery and equipment.
Aero Products Div., GMC, Vandalia, Ohio—machinery and equipment.

(Continued on page 222)

A typical cross-section assortment of file-steel stock. Sixteen such bundles weigh approximately a ton.

NICHOLSON FILES... A FILE FOR EVERY PURPOSE

How to s-t-r-e-t-c-h a ton of steel

No one needs to be told that one of the nation's most critical materials today is STEEL. With allotments for civilian use being cut, conserving what remains is the duty of every manufacturer and user of industrial tools.

Among the most vitally needed tools are files. Steel is the only material from which they can be made. The supply must be "stretched":—

1 ***By putting the utmost wear and efficiency into every file*** . . . for it takes no more steel to produce carefully shaped, accurately cut, properly hardened files than to turn out poorly made, short-lived ones. That's "stretching" steel in the *making* of files . . . in which Nicholson is doing its part wholeheartedly.

2 ***By proper selection, use and care of The right file for the job.*** That's "stretching" steel in the *using* of files. In all of these directions, the industrial distributor can help the industrial user. The purchaser, in turn, can add to the "stretch" by enforcing the "Do's" and "Don'ts" of file conservation among his production heads, tool-keepers and mechanics.

3 By screening down (for the duration) purchases of near-duplicate file types, cuts and sizes—that is, making one file specification do where two nearly-alikes are normally desirable. Here's where all three—manufacturer, distributor, user—can contribute to "the stretch of files and steel."

"FILE FILOSOPHY," Nicholson's famous 48-page handbook, has many hints on use and care of files. FREE—how many copies do you need to pass around among your shop foremen?

NICHOLSON U.S.A.

NICHOLSON FILE CO., 29 Acorn Street, Providence 1, R. I.
(In Canada, Port Hope, Ont.)

(Continued from page 220)

Republic Aviation Corp., Farmingdale, L.I., N.Y.—airplane overseas packaging, mobile training units.

Bop Assemblies Div., GMC, Detroit—facilities.

New Britain Machine Co., New Britain, Conn.—machine tools.

General Electric Co., Syracuse, N.Y.—transformers.

Cornelius Co., New Brighton, Minn.—machinery and equipment.

Jacobs Aircraft Engine Co., Pottstown, Pa.—machinery and equipment.

United States Time Corp., Waterbury, Conn.—industrial facilities.

National Electric Corp., Dayton, Ohio—surplus electronic equipment.

American Air Motive Corp., Miami Springs, Fla.—engine.

Kindred Aviation Corp., Burbank, Calif.—exhaust engine.

Harman Electrical Mfg. Co., Mansfield, Ohio—reverse current cutout.

G. Felsenthal & Sons, Chicago—computers.

Budd Co., Philadelphia—machinery and equipment.

Wolverine Diesel Power Co., Detroit—power plant assemblies.

J. O. Mfg. Co., South York, Calif.—torque testers.

Bullard Co., Bridgeport, Conn.—industrial facilities.

Wagner Smith Co., Dayton—electrical distribution system.

Whirlpool Corp., St. Joseph, Mich.—machinery and equipment.

Landish Co., Cudahy, Wis.—hammer assembly.

Ford Wagner Co., Cincinnati—belt printer.

Philadelphia Air Transport Co., Norriston, Pa.—dryer assembly.

Consolidated Photo Engravers, Chicago—photographic equipment.

American Chronoscope Corp., Mt. Vernon, N.Y.—timer assembly.

American Stove Company, St. Louis—fuel tanks.

Consolidated Ind., Inc., Lafayette, Ind.—fuel tanks.

Roth Office Equipment Co., Dayton—steel filing sections.

R. Wallace & Sons Mfg. Co., Wallingford, Conn.—link parachute connector.

Hollensak Optical Co., Rochester, N.Y.—Fastex camera.

Bol, Ltd., New York—camera.

Boeing Airplane Co., Seattle, Wash.—modification kits, sling assembly.

Eicor, Inc., Chicago—generators, exciters, spare parts.

Lycoming Spencer Div., Avco Mfg. Corp., Williamsport, Pa.—generator sets.

Radioplane Co., Van Nuys, Calif.—target aircraft autopilots.

Technitrol Engineering Co., Inc., Philadelphia, Pa.—radio test set.

American Gas Accumulator Co., Elizabeth, N.J.—transformer.

Raymond Rosen Engineering Prod. Inc. Philadelphia—receiver assembly.

Despatch Oven Co., Minneapolis, Minn.—electric ovens.

Gallmeyer & Livingston Co., Grand Rapids, Mich.—surfacer grinder.

Weston Electrical Instrument Co., Newark, N.J.—ammeters.

Fonda Corp., Glendale, Calif.—film-processing machine.

Fairchild Camera & Instrument Corp., Jamaica, N.Y.—photographic spare parts.

Carrier Corp., New York—air-conditioning equipment.

Continental Electronics Co., Brooklyn, N. Y.—connector adapter, plug.

Yale & Towne Mfg. Co., Stamford, Conn.—fuel-pump maintenance parts.

Enterprise Div., General Metals Corp., San Francisco—generator sets.

Lanagan & Hoke, Philadelphia—field tester.

National Farm Machinery Corp. Inc., Bellevue, Ohio—trailer.

Jack & Heintz Precision Industries, Inc., Cleveland, Ohio—generators, inverter.

Scintilla Magneto Div., GMC, Sidney, N.Y.—connector plug receptacles.

Unity Mfg. Co., Chicago—spotlight assemblies.

General Electric Supply Corp., Dayton—connector plug receptacles.

American Time Products, Inc., New York—recorder.

Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.—autopilot components.

Bill Jack Scientific Instrument Co., Solana Beach, Calif.—cameras, control system.

Parker Appliance Co., Los Angeles—fuel valves.

Bendix Aviation Corp., Sidney, N.Y.—magneto component parts.

Metal Industries, Inc., Indianapolis, Ind.—trainer.

Bendix Radio Div., Bendix Aviation Corp., Baltimore, Md.—transformer.

Gedro, Inc., Stamford, Conn.—reflector section.

Radioplane Co., Van Nuys, Calif.—target spare parts.

Bendix Products Div., Bendix Aviation Corp., South Bend, Ind.—speed-density-metering unit.

Curtiss Wright Corp., Caldwell, N.J.—trainers.

Curtiss Wright Corp., Woodridge, N.J.—engine spare parts.

Sorensen & Co., Stamford, Conn.—power units.

Royal Electric Co., Jamestown, Ohio—inverter spare parts.

Sylvania Electric Products, Inc., Buffalo, N.Y.—tuning unit.

Crosley Motors, Inc., Cincinnati, Ohio—shackle assembly.

A.C. Spark Plug Div., G.M.C., Flint, Mich.—spark plugs.

American Bosch Corp., Springfield, Mass.—magneto assemblies.

Eclipse Pioneer Div., Bendix Av. Corp., Teterboro, N.J.—accelerometers, special wrenches.

Gould Storage Batteries, Depew, N.Y.—storage batteries.

Eastman Kodak Co., Rochester, N.Y.—photographic lenses.

Espey Mfg. Co., New York—radio sets.

Broadway Maintenance Corp., Long Island City, N.Y.—high-frequency amplifiers.

Wickes Engineering & Construction Co., Camden, N.J.—amplifier assemblies.

Transmitter Equipment Mfg. Co., Inc., N.Y. N.Y.—synchronizers.

Inland Equipment Co., Nashville, Tenn.—tester.

Toll & Henson Co., Detroit—field-maintenance shelter.

American Gas Accumulator Co., Elizabeth, N.J.—connector and cable assembly.

United Mfg. Co., New Haven, Conn.—aircraft generators.

Cannon Electric Co., Los Angeles—connector-plug receptacles.

Kollsman Instrument Corp., Elmhurst, N.Y.—altimeter.

Radioplane Co., Van Nuys, Calif.—ground handling control kits.

Instrument Associates, Great Neck, N.Y.—oxygen gages.

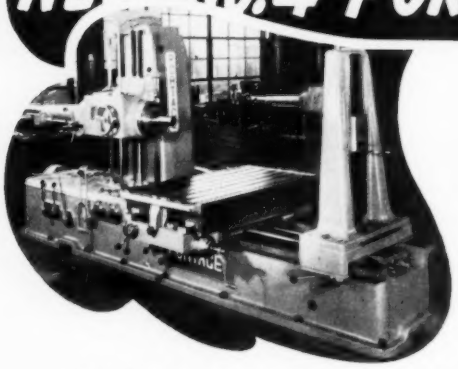
Lord Mfg. Co., Erie, Pa.—port plugs.

Hydraulic Press Mfg. Co., Mount Gilead, Ohio—press.

Jones & Lamson Machine Co., Springfield, Vt.—machine tools.

National Electric Welding Machine Co., Bay City, Mich.—machine tools.

NEW No. 4 PORTAGE



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Boring
Drilling
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Machine

• In addition to rigid construction throughout, this machine features safe, convenient control. All control levers are located on the front of the machine at a convenient height and within easy reach of the operator from his normal working position ... These are but two of the numerous design and construction points that make for continued accuracy—ease of operation and greater production ... For complete detailed description write for the new PORTAGE No. 4 Horizontal Boring, Drilling and Milling Machine bulletin. No obligation.

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How wide a tolerance can an air gage check?

Right: Triple Dial CompAIRator simultaneously checking three dimensions of asbestos cylinders with tolerances of .120".

Up to 120 Thousandths . . .

if it's a Taft-Peirce CompAIRator.

No other gage combines the range, speed, and economy of these versatile T-P gages.

Left: Standard CompAIRator unit with special plug to check clearance for packing rings in bearing housings of steam turbines. Tolerances ±.020".

NOTE: The same standard Taft-Peirce CompAIRator used when tolerances are as narrow as .000050" can be used for tolerances up to .120".

Complex measurements, such as checks on taper, concentricity, center distances, and squareness of bore to face, are easily made with this simple design.

Internal diameters as small as .058" can be checked completely. Tapers can be read directly with a single pointer on a single dial! Contact your local Taft-Peirce representative for the full facts — or write for Catalog 610.

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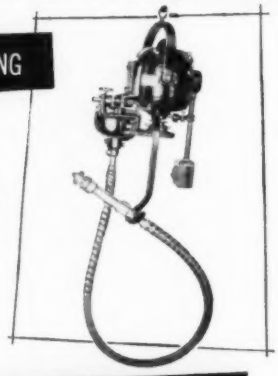
You'll find a Strand FLEXIBLE SHAFT MACHINE for

OVERHEAD MOUNTING



For production line work, overhead-mounted flexible shaft machines are a real convenience. Motor and mechanism are out of the way and flexible shaft conveniently located. To meet your requirements, review all models of STRAND flexible shaft machines. Model shown is three-speed vertical type for overhead mounting . . . it is available in ⅓ H. P. to 1½ H. P. inclusive.

BENCH MOUNTING

Here is convenient flexible shaft equipment that can be mounted on bench right near the work. Portable to the extent that it can be taken from place to place. For steady, fast production, consider the bench-mounted flexible shaft machine as part of your production setup. Model shown is three-speed mounted on swivel type adjustable bench column. Available in ⅓ H. P.

FLOOR MOUNTING

The floor-mounted flexible shaft machine is one of the most popular. It can be moved from place to place. Amply powered, the standard is out of the way while the head is light and easy to work with. Model shown is three-speed mounted on swivel yoke adjustable floor type tripod. Available in ⅓ H. P. to 1½ H. P. inclusive.

STRAND flexible shaft machines are known for their quality and outstanding performance. They have long life and the stamina to take hard work with the least amount of interruption. There is a complete line to choose from—write for catalog 31.

The Baldwin Corporation
Woodberry, Baltimore 11, Md.
N. A. STRAND DIVISION
5001 N. Walcott,
Chicago 40

STRAND
FLEXIBLE SHAFTS
and
FLEXIBLE SHAFT MACHINES

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A CLEVELAND TAPPER set up on a munitions job, tapping a 1 15/32", 16-pitch Buttress thread in SAE 4143 steel tubing hardened to 35 to 37 Rockwell.

Cleveland engineers can save production dollars and valuable working time by designing a CLEVELAND TAPPER which will not only combine several operations but also tap groups of holes at one stroke of the machine.

Check with Cleveland FIRST

Only CLEVELAND offers you all these features.

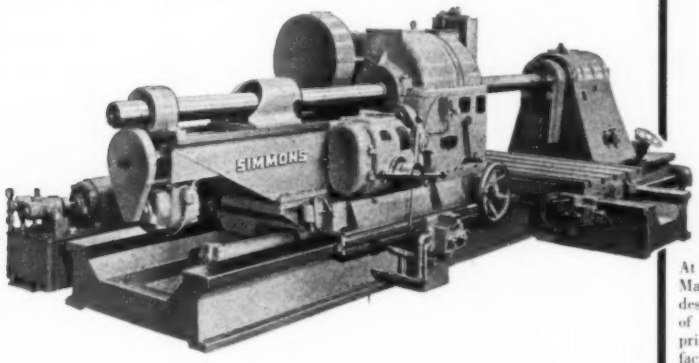
- *Precision hardened and ground lead screw.*
- *Fully automatic or manual control.*
- *Precision depth control for blind hole tapping.*
- *Heat treated alloy steel spindles for maximum strength.*
- *Easily changed spindle speeds.*
- *Exclusive super sensitive clutch reduces breakage and increases tap life.*
- *Positive coolant and lubricant supply under constant control of operator.*
- *Rigidly constructed to give years of service.*
- *Maximum safety for operator and machine.*

Write for "Production Tapping Guide" AM-3

THE CLEVELAND TAPPING MACHINE CO.
A Subsidiary of AUTOMATIC STEEL PRODUCTS, INC.
CANTON 6, OHIO

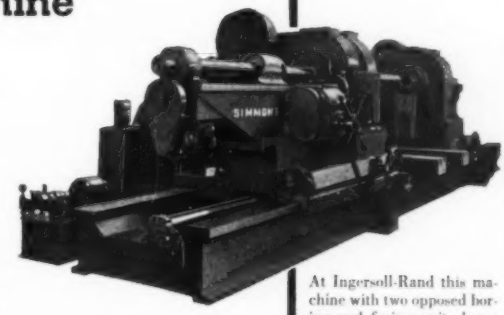
Boring large holes with long depths?

Here's a machine to do it accurately in less time—with carbide tooling.



At Worthington Pump and Machinery Corporation this design is used for a variety of work in addition to its primary job of boring and facing large cylinder liners.

Simmons 6" Bar Horizontal Boring and Facing Machine



At Ingersoll-Rand this machine with two opposed boring and facing units bores large centrifugal pump castings.

Whether you are building diesel engines, large turbines, refrigerator machines, centrifugal pumps or any other heavy equipment which requires accurate boring of large cylinders, *this new Simmons machine is designed to do it accurately and quickly.*

Picture these operating advantages:

1. **Automatic and continuous feed facing head which permits high speed facing with carbide tools.**
2. **Hydraulic feed to entire head in addition to normal bar feed.**
3. **Boring head fed to and from work reduces overhang of boring bar to a minimum. Greater accuracy is the result.**
4. **Bar speeds between 3 and 200 rpm and bar feeds from .0005" to .500" per revolution.**
5. **Unit type construction enables basic boring and facing unit to be adapted by Simmons to your special requirements.**

Designed for rugged yet precise performance, the Simmons 6" Horizontal Boring & Facing Machine is equipped with motor drive up to 50 H.P. Precision anti-friction bearings and alloy steel gearing are used throughout.

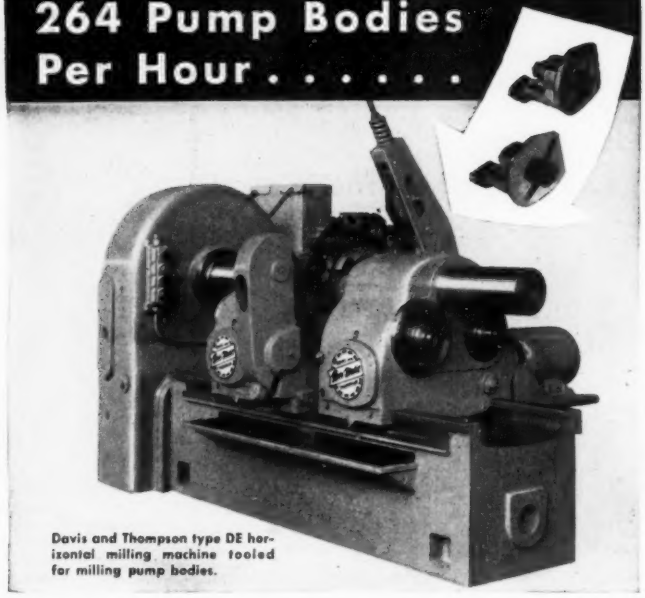
Standard length of the bar is 17 feet. Travel in one setting is 72". Bed lengths and widths can be supplied to meet requirements.

Simmons engineers will work with yours in adapting this machine to your specific needs. Write today for details.

SIMMONS MACHINE TOOL CORPORATION

1759 NORTH BROADWAY, ALBANY 1, N. Y.

264 Pump Bodies Per Hour . . . . . .



Davis and Thompson type DE horizontal milling machine tooled for milling pump bodies.

1-A Standard Horizontal Milling Machine

Oil pump bodies requiring high degree of finish and high production are rough and finish milled on both sides simultaneously with this Davis and Thompson type DE milling machine. Production is 264 pieces per hour.

Patented Angular Spindle Adjustment Allows "Toe Cutting"—Maintains Fine Finish at High Production

The finishing spindle is provided with an exclusive D&T design which allows angular adjustment. This in turn results in "toe-cutting" and eliminates "drag" of the cutter over the finished surface. Both roughing and finishing spindles have micrometer endwise adjustment.

A Basically Standard Machine Employing Roto-Matic Principle For High Production Special Milling

Like all D&T machines this model DE is designed for long life and trouble-free operation. Each head has independent drive. There is backleash take up to mandrel. Anti-friction bearings throughout. Rapid traverse between cuts can be incorporated.

Free Data will be furnished upon request.

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Davis & Thompson Company

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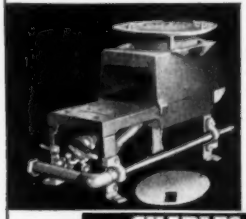

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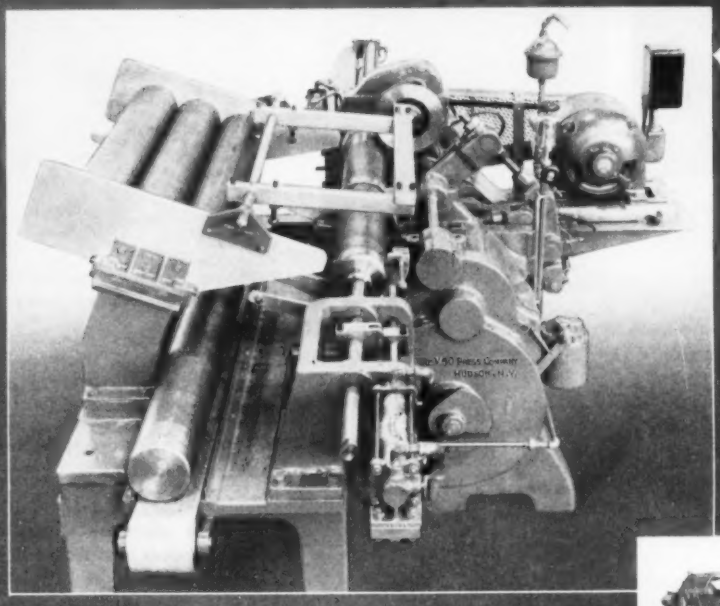

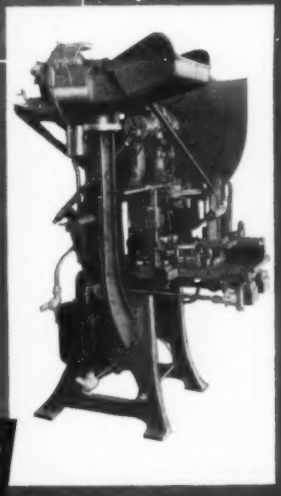

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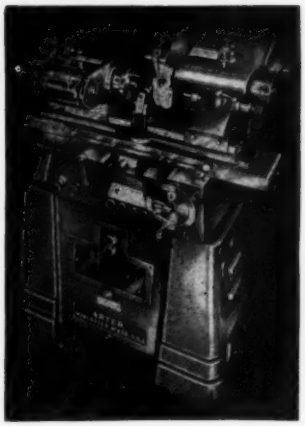

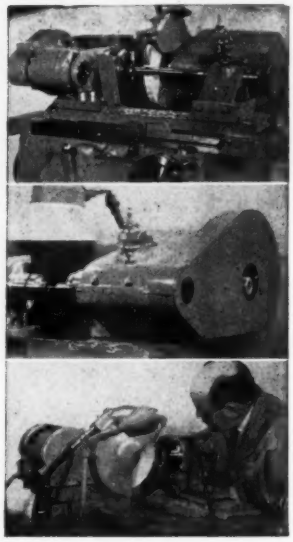

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MODEL No. 103

A relatively low-priced machine for cylindrical, internal, end or surface grinding.

The ARTER Model No. 103 grinder can be purchased as a combination machine for the classes of work illustrated, or it can be purchased just for cylindrical jobs, or for internal work. Many of these machines are being used for tool room work or as auxiliary equipment to take the overload of higher priced machines.

Capacities: With internal head—⅛" to 3" dia. x 4" long. With external head—3" dia. x 10" long. Swing over table 9".

ARTER
GRINDING MACHINE CO.
WORCESTER, MASSACHUSETTS • U. S. A.

From the *American Machinist* Library of *Tips for Top Shop Men*

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MICROSTRUCTURE, rather than composition, may frequently be the key to successful machining of a part. Two pieces that look alike and were made alike may be entirely different in their reaction to a tool.

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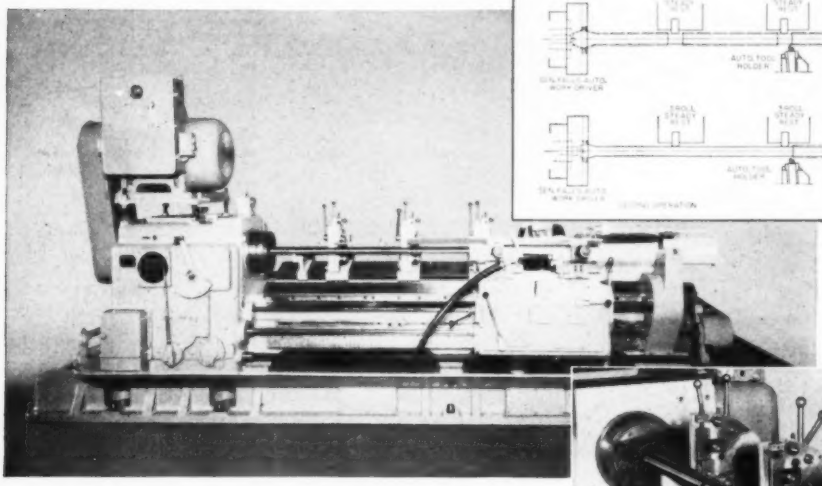
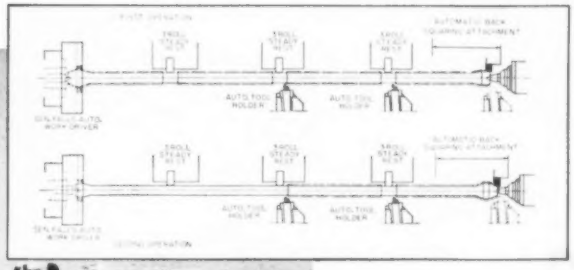
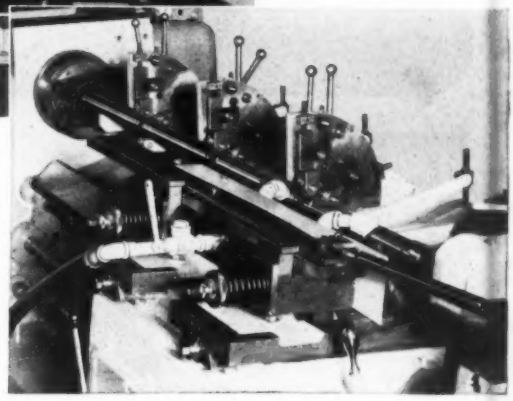
MACHINE OF THE MONTH

PREPARED BY THE SENECA FALLS MACHINE CO. "THE *Lo-swing* PEOPLE" SENECA FALLS, NEW YORK





Above: Tooling Layout for 1st and 2nd operations on Torsion Bars.



THE MODEL "AP" Semi-Automatic *Lo-swing* LATHE... SOLVES TORSION BAR TURNING PROBLEM

Problem: Turn spline diameters, chamfer or form ends, and turn long undercut on Torsion Bars, 2¾" diameter by 80" long.

Solution: The Model "AP" Semi-Automatic Lo-swing Lathe was selected for this work, since its rack and pinion front carriage feed permits long cuts which cannot be made with cam operated, fully-automatic lathes. Also, the design and construction of the Model "AP" bed, carriage and three-roll steady rests permit the front turning tools to pass by the steady rests without interference. This design is very important for turning long Torsion Bars made from high resistance steel and requiring considerable support from steady rests when being machined with tungsten carbide cutting tools.

The operating cycle is extremely simple. The operator loads the Torsion Bars in two cradles clamped to the bed of the machine adjacent to the head and tailstock centers. The control valve for the air-operated tailstock quill is then opened and the Torsion Bar is pushed forward through the Automatic Work Driver and on to the headstock center. The three steady rests are then locked on previously ground spottings; the carriage is power rapid traversed to the cutting position and the cross slides, with their cutting tools, power traversed to the proper depth of cut. At the end of the longitudinal feed, cutting tools are power relieved and the carriage returned to starting position in power rapid traverse.

The contour of the Torsion Bar is controlled by a special template and template operated tool blocks which are visible in the close-up view illustration. This illustration also shows the non-slip Seneca Falls Automatic Work Driver which drives the work.

Two lathes, one for turning each end of the shaft, are usually serviced by one operator.

SENECA FALLS MACHINE CO., SENECA FALLS, N. Y.

PRODUCTION COSTS ARE LOWER WITH *Lo-swing*

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Recommended for export handling and unusual shipping conditions requiring maximum protection.

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Hardwood pallets, reusable and expendable types.

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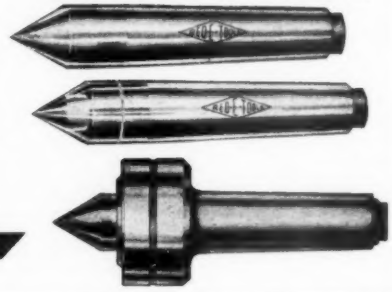

RED-E TOOLS
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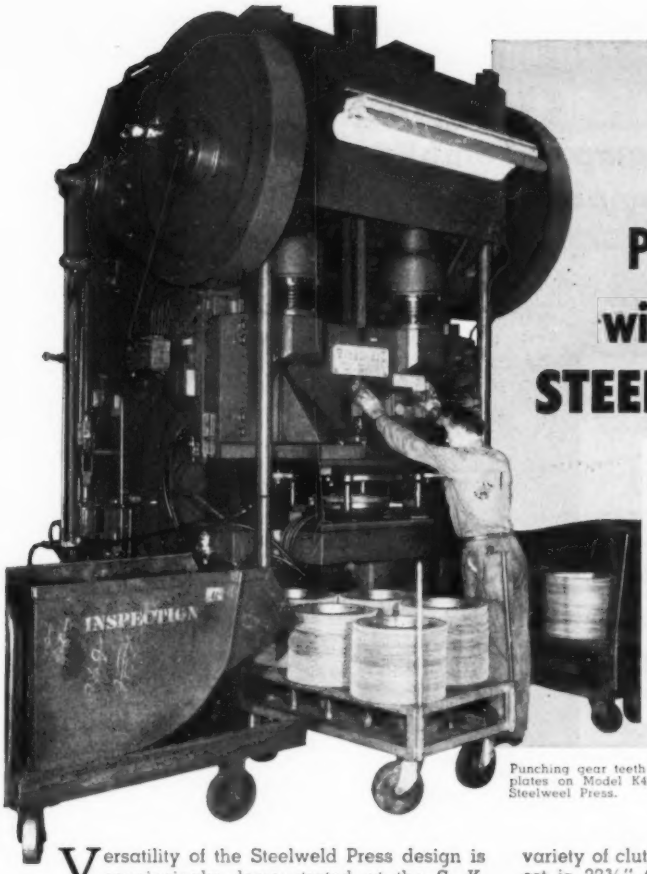
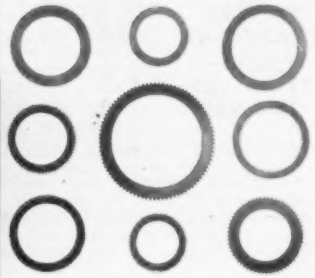
2,000 Clutch Plates Punched Per Shift with SPECIAL STEELWELD PRESS



Punching gear teeth in clutch plates on Model K4-4 300-ton Steelweel Press.



Some of the many plates punched on the Steelweld Press, ranging from 11¾" to 22¾" diameter, all of .089 steel.

Versatility of the Steelweld Press design is convincingly demonstrated at the S. K. Wellman Co., Cleveland, where a machine, adapted for punching purposes, turns out 2,000 clutch gear rings per eight hour shift. Equipped with a specially wide bed and ram for accommodating the dies, and vertical tie rods at front for securing necessary rigidity, the design provides an economical press with stamina required for heavy-duty service.

Installed late in 1949, the machine has been in nearly continuous operation ever since, working 24 hours a day, six days a week. A large variety of clutch plates are punched. The largest is 22¾" O.D. of 13-gauge steel, with all teeth on the outside being punched at one stroke. The heaviest clutch plates punched are of 11-gauge steel. Multiple punching and notching are also done. The gear ring discs and washers are usually run through in lots of 4,000 to 25,000 at a time.

Because of satisfaction with this press, Wellman has purchased another larger Steelweld Press to help satisfy the growing demand for "Velvetouch" clutches, plates, facings and brake linings, used widely on tractors, trucks and heavy industrial equipment.

GET THIS BOOK!

CATALOG No. 2010 gives construction and engineering details. Profusely illustrated.

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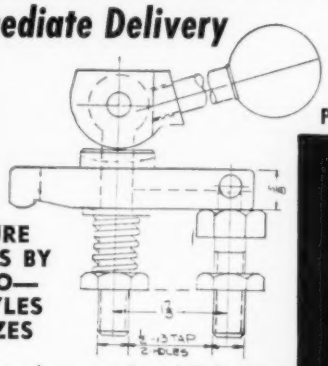
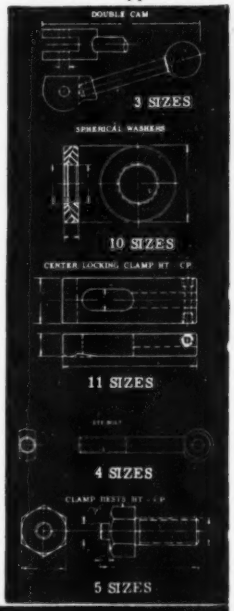
TEMPLATE DWGS OF ALL CLAMPS & PARTS SENT ON REQUEST



WESPO TYPE NO. 2, CLAMP ASSEMBLY

Below shows Parts of Type No. 2



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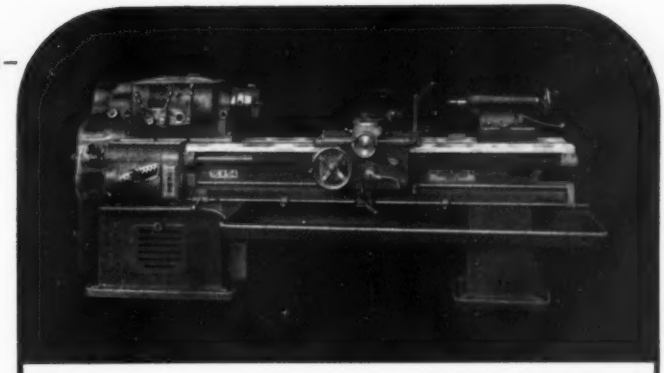
From the *American Machinist* Library of *Tips for Top Shop Men*

IF you have worked with your hands, your normal tendency in a crisis will be to work with your hands again. There are times when this will impress the men who work for you, do much to knock down any idea that you're an incompetent stuffed shirt. But never forget that you're paid now for working with your head, and that headwork demands more perspective than handwork is likely to give you. Also remember the thrill you got out of achievement and give the next generation the same chance to grow.

Standard Model—



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PLUS –

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Quick Withdrawing Attachment for Threading.
Large Hole thru Spindle Accommodating Large Collet Capacity.
Spindle Nose Optional; Flanged Type Cam Locking, Long-taper Type Key Driven, Hendey Standard Threaded Nose.
Lathe Equipped with the New High Speed Apron Reverse for Lead Screw.
New Feed Dials, Large, Accurate and Quick Reading.
Micrometer Carriage Stop; Automatic Longitudinal Stops in Either Direction of Travel.
New Positive Cross Slide Stop.
New Re-inforced Bed Brackets with Anti-friction Bearing for Tail End of Lead Screw.
Special Clamping Device for Tailstock.

Every feature necessary for precision turning at modern production speeds is incorporated in the 16-inch, 18-speed Hendey engine lathe — in other words, *Built to Hendey's Modern Precision Standards.* The operator will find every convenience—from easy-operating controls to features that practically eliminate maintenance. Induction hardened and precision ground bed ways provide life-long precision for both carriage and tailstock. This modern Hendey Tool Room Lathe is available in standard and tool room models. The latter is shown below with sub-headstock for producing threads with long leads. *Write for catalog.*

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MAIN OFFICE & PLANT: TORRINGTON, CONN.
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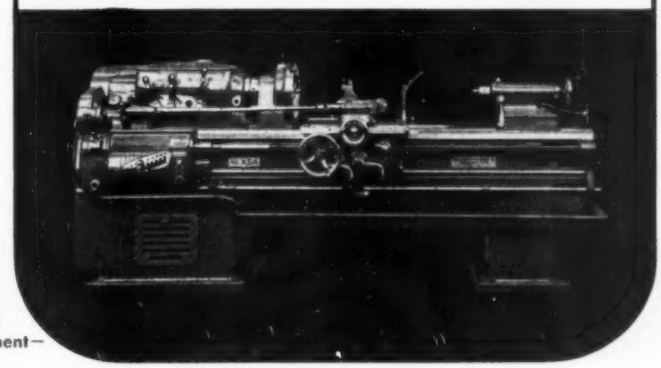

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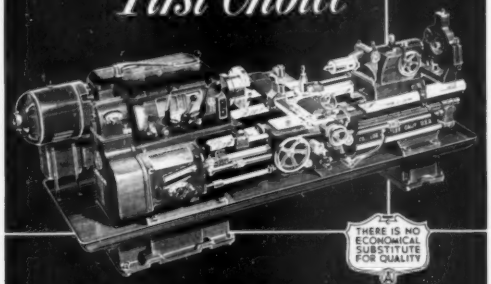

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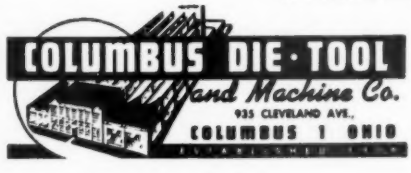

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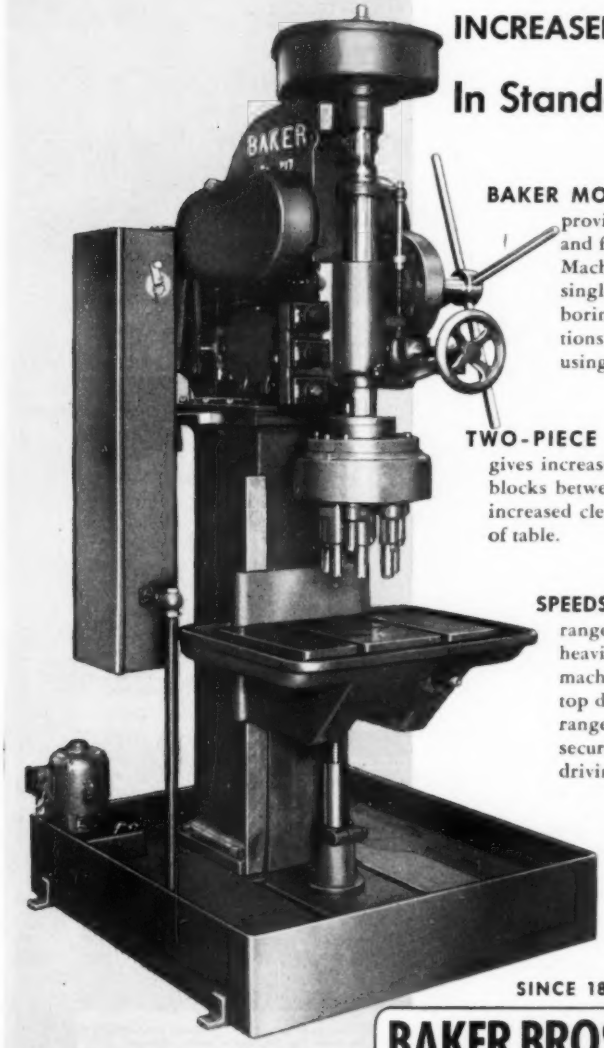

BAKER MODEL 217 HEAVY DUTY DRILL provides a selection of spindle speeds and feeds secured through pick-off gears. Machine can be adapted to heavy duty single spindle drilling, counterboring, boring, facing, forming or tapping operations and to multiple spindle operations using multiple spindle heads.

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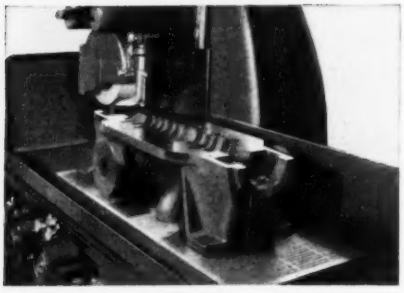

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700 connecting rods per hour, using 40 station fixture to finish grind crank and wrist pin end of assembled rod with Mattison No. 72 Grinder.

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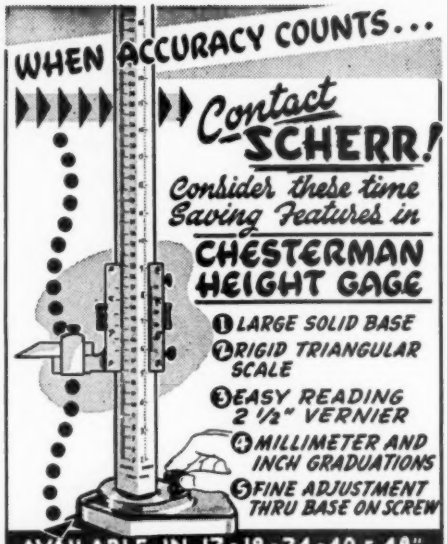
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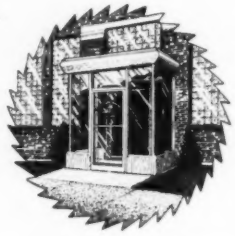

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DON'T flaunt your greater income or privileges before your subordinates. No matter how much they like you, their resentment and envy will do you more harm than the flaunting does your ego good.

REMEMBER that human problems need careful study just as do engineering problems. Man is multi-motivated and one prescription won't cure all his ills.

BE suspicious of any figures you hear, and of most of those you see. If they don't correspond immediately to your previous experience, check 'em before you quote or use 'em. The urge to make numbers bigger, or smaller than anything previously reported is overpowering to some people; don't be victimized.

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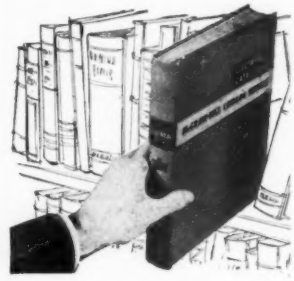

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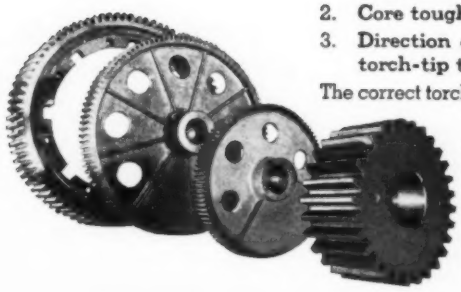

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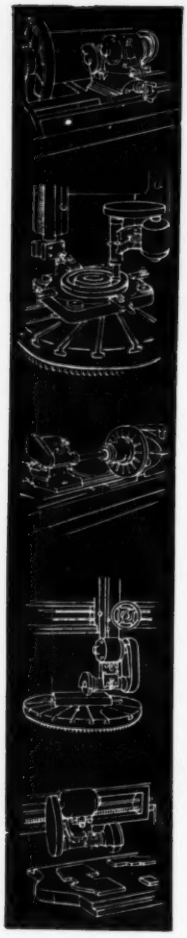

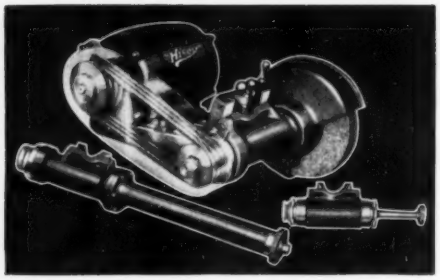

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Either internal or external—your boring mill, too—and planer and other machine tools in your shop, are now capable of precision grinding of rolls, surface plates, bearings, journals, mandrels, cutters, etc. They merely require a HISEY Wide Range Precision Grinder attached to their regular tool holding fixture.

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HEADQUARTERS FOR BUSINESS INFORMATION

McGRAW-HILL publications

From the *American Machinist* Library of *Tips for Top Shop Men*

GET to know your people *before* you have to get tough with 'em. It's poor policy to make their acquaintance by bawling 'em out. Introduction by insult is no longer a successful management routine.

THE old Army slogan, "If it moves, salute it; if it doesn't, pick it up; if you can't pick it up, paint it," can well be adapted for plant use by changing "salute" to "guard" and "paint" to "oil."

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These checks are worthless pieces of paper until they're cleared at a central clearing house. Until that time, the bank has literally given its money away!

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DO YOU MANUFACTURE PUZZLES?

How many man hours are lost every day in your plant because metal components are not properly marked?

How much time do your customers spend trying to identify parts for reordering?

Are you losing good business because your components are not permanently and legibly marked for *instant identification?*

Would the use of modern marking equipment save you money?

Simply send prints or samples of parts to be marked, together with exact lettering and its location, for free recommendations.

WRITE FOR CATALOG

MARKING MACHINES — ENGRAVED STAMPING AND EMBOSSING DIES — SPECIAL MARKING TOOLS — NUMBERING HEADS — HAND STAMPS

IDENTIFICATION *is your* **PRIME EXPEDITER**

GTS **GEO. T. SCHMIDT, INC.**
1810 W. BELLE PLAINE AVENUE
CHICAGO • 13 • ILLINOIS

From the *American Machinist* Library of *Tips for Top Shop Men*

SLAVERY was not abolished by Lincoln. He did end physical slavery, but man himself must end mental slavery to habit. Education will help, but the real problem is to breed a race of open-minded, inquiring men who welcome the chance to wonder, to question and to analyze—then to take a chance on a new idea that looks sound.

PROCEDURE for methods improvement: Pick an operation to be improved. Put down in writing what happens—the details. Challenge each detail in order. Where a chance for improvement appears, develop the better method. Apply it on the job.

How to read with your eyes open for business!

Read the ads! Every issue of this magazine contains ads that offer valuable services and useful products by which your business may be run more profitably.

The time it takes to read all the ads is time well spent. One ad alone can pay off—by informing you of new developments and new sources of supply, by helping you do a more efficient job. For example, you may locate one machine that will cut your production costs, or step up your output. Or you may discover that the equipment you've been waiting for is now available.

This magazine displays more ideas and merchandise than a trade exposition. Make every issue your buyer's guide. Read the ads as well as the articles. That's reading with your eyes open for business.

HEADQUARTERS FOR BUSINESS INFORMATION

McGRAW-HILL publications

F-24

RUGGED TOUGHNESS...

Velvet Smoothness

FOR HIGHER SPEEDS FASTER PRODUCTION

Sturdy, longer life built into every length of Atlas Roller Chain assures rugged toughness on every installation. The Atlas Nicarb Process used for case hardening bushings and pins is one big reason for the stamina of Atlas "Super-Life" Chain. Nicarbing provides an outer surface strongly bound to the core of steel which provides greater strength and wear resistance.

Atlas Chain drives operate with a velvety smoothness made possible by precision made bearings rolling at every point of contact. These bearings—pins, bushings and rollers—are of specially selected steels finished by Atlas's Exclusive "Mirro-finish" process.

The result is a super-life chain that minimizes wear and repair. Greater efficiency . . . greater economy on every drive. To speed up production and cut maintenance install Atlas positive-power drives. Write for new handbook and catalog on chain drives . . . no charge, no obligation.

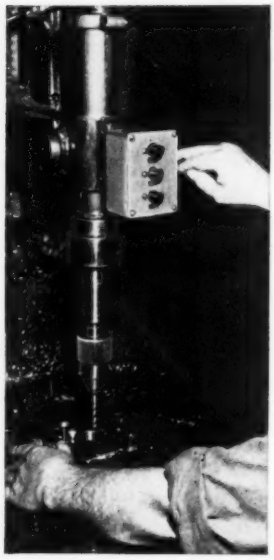
ATLAS CHAIN & MANUFACTURING CO.
Philadelphia 24, Penna.

ATLAS ROLLER CHAIN

Wahlstrom Automatic Chucks

Speed Cutlass, Corsair Production

at Chance Vought Aircraft



"Wahlstrom Automatic Chucks make possible maximum usage of equipment," says Maury E. Foster, Group Foreman at Chance Vought Aircraft, Division of United Aircraft Corporation.

Leading manufacturers choose AMF Wahlstrom Fully Automatic Chucks because *one spindle does the work of several.* Drill-press operators change drills quickly—while the spindle is running. They're great time savers in changing tools on drill press work...for spotting, drilling and reaming in jig borers and millers...in lathe work for burring, turning and filing.

See your local distributor or write for Bulletin 56-S.

WAHLSTROM TOOL DIVISION
AMERICAN MACHINE & FOUNDRY CO.
5502 Second Avenue, Brooklyn 20, N. Y.

Wahlstrom—only fully automatic drill chuck holding widest range of straight-shank tools—is available in Model A (1/32" to 1/2"), Model AA (1/64" to 3/8"), Model B for larger straight-shank tools, Model C for taper shank tools, and fully automatic tappers.

amf **WAHLSTROM**
fully automatic **CHUCKS**

NO KEYS, COLLETS OR WRENCHES

From the *American Machinist* Library of *Tips for Top Shop Men*

TAKE a man's pride in his job away, and there isn't much left; he becomes another automaton. Even a trained seal enjoys the applause as much as he does the fish.

WHEN you walk the tight-rope between close tolerances, or between good and bad finish, balance is vital. Be sure you have it, in machine-tool spindle or shaft, in tooling, in fixture. It will pay out in longer tool life and reduced scrap.

McGRAW-HILL

TECHNICAL WRITING SERVICE

Writing

Whether you need an instruction book or service manual to accompany your equipment written to government specifications . . . or product catalogs . . . or training booklets . . . or industrial literature . . . our writing staff can do the job for you. It will do the research, planning, writing, and organizing to satisfy your requirements.

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For government publications or industrial literature, our Art department can meet your specifications, or those of the government agency, for isometrics, exploded views, cutaway views, retouched halftone copy, rendering, lettering, or any other type of art work. It can design to standardized format or present industrial visuals of compelling appeal.

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The editors of our staff are thoroughly familiar with government publication specifications. In addition to being technical editors, they are also experienced in rewriting and organizing rough manuscript, or in revising published material. Many have taught or have been trained in teaching and are, therefore, able to recommend or inject proper pedagogical presentation of material.

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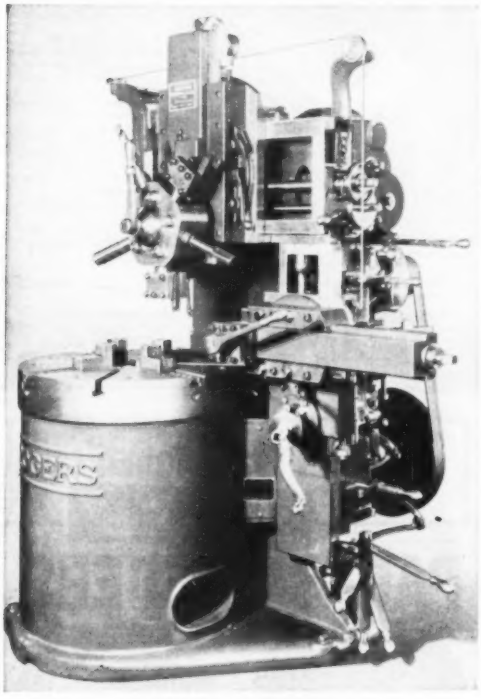
PRECISION BUILT "Perfect 36"

VERTICAL TURRET MILLS Sell for

So Much Less



FACTORY TESTED

The main gear-box assembly, side head and main head are independently "broken-in" on a block. This mill is fully tested and put through its paces on the final assembly line under actual working conditions. No short cuts are permitted in manufacturing procedure that would impair the quality or life of Rogers "Perfect 36" Vertical Turret Mills.

With one standard size mill (36" machining capacity), Rogers are precision built with assembly line efficiency and economy.

Built into every Rogers Vertical Turret Mill are over 60 years of developments and engineering achievements. Rogers Mills built over 50 years ago are still **Boring, Drilling, Turning, and Threading ferrous and non-ferrous castings and forgings.**

Rogers Mills that are being delivered today will make similar records in the years to come because they are built by craftsmen backed by generations of experience.

Write for Quotation and Fully-Illustrated Catalog Today.

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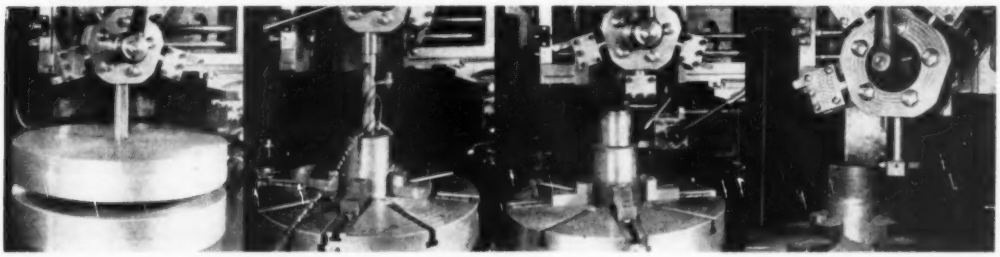
Knowing How Since 1885

BORING **DRILLING** **TURNING** **THREADING**

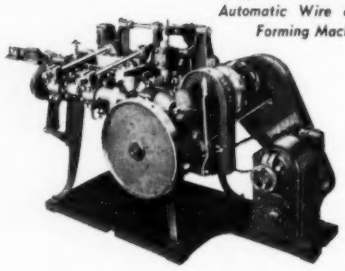


For Perfect Forms

THERE'S NOTHING LIKE A

NILSON

Designers and Builders of Automatic Wire and Metal Forming Machinery



Look at a Nilson Four Slide Machine for "Formed Stampings." Nilson Four Slide Machines are fully automatic in operation. "F" Models with built-in Press pierce, stamp or swage, then form the complete piece—all in one operation. A wide range of sizes is available to handle your particular requirements most economically.

- For Speed in Production
- Accuracy in Forming
- Versatility in Application

Automatic Wire and Metal Forming Machines—Staple Forming Machines—Chain Making Machinery—Wire Reels—Wire Straighteners

Our experience in building automatic machinery qualifies us to invite your inquiries for special machinery or contract work required in the defense program.

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1508 Railroad Ave. Bridgeport 5, Conn.

SPECIALISTS IN WIRE FORMING EQUIPMENT FOR OVER 50 YEARS

THREAD BROACHING

ENDS TAPPING TROUBLES

THREAD BROACHING • THREAD BROACHING
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Ultra Precision
THREAD-CUTTING BROACHES deliver these advantages:

- End tapping trouble.
- Produce threaded holes by a Shearcutting action.
- Are practically unbreakable.
- Ground from hardened high-speed solid blanks.
- Require only half the power needed for tapping.
- Have an amazing long life.
- May be resharpened many times.
- Feed the chips out of the hole.
- Lower production costs.
- Replace standard taps in most sizes.

SHEARCUTTER TOOLS COST LESS IN THE LONG RUN

These ultra-scientific cutting tools are used by practically every large manufacturing company in the U.S.A. Constant repeat orders prove their merit and value.

Patent Warning. All Shearcutter Tools are protected by U.S. and Foreign Patents, received, pending or applied for.

*ANOTHER AMAZING INVENTION OF RALPH GORDON FEAR

SHEARCUT TOOL CO.

MANUFACTURERS OF THE WORLD'S MOST SCIENTIFIC CUTTING TOOLS

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INCREASE CAPACITY of grinders and presses, inspection and packaging devices, and other automatic processing equipment AT REDUCED COSTS by feeding parts of most sizes, shapes and materials single file . . . at variable rates . . . in oriented position . . . and without damage.

Catalog data upon request. Or send details of your problem along with sample parts to . . .

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A·S·R asked

Where to get a small handle button, wear-and-water-resistant . . . light enough to be set in plastic . . . produced in large quantities, quickly and inexpensively?

GRC* answered

Tiny GRC precision zinc die castings will make Ideal handle buttons for the new Gem razor . . . meet to a T every ASR specification!

American Safety Razor's new Feather Weight Gem Razor weighing only 1 1/10 oz.

*WITH GRC TINY PRECISION ZINC DIE CASTINGS!

If obtaining really small parts speedily and economically is your problem, too, why not let GRC tackle it? Gries' revolutionary, high speed, mass production methods are geared to turn out simple or intricate parts in one automatic operation. Trimmed, ready for use . . . GRC zinc die castings as small as .000004 of a lb. in lots from 100,000 to millions . . . at a price to help you produce at a profit! Remember . . . it's GRC for *smallness unlimited*.

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SMALLNESS UNLIMITED

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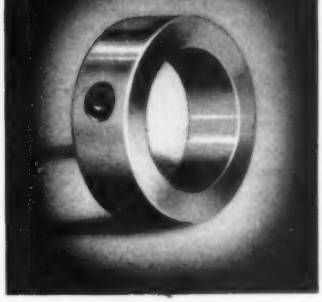
SOLID STEEL COLLARS
with
UNBRAKO
Self-Locking
HOLLOW SET SCREWS



How to read with your eyes open for business

Read the ads! Every issue of this magazine contains ads that offer valuable services and useful products by which your business may be run more profitably.

The time it takes to read all the ads is time well spent. One ad alone can pay off – by informing you of new developments and new sources of supply, by helping you do a more efficient job. For example, you may locate one machine that will cut your production costs, or step up your output. Or you may discover that the equipment you've been waiting for is now available.

This magazine displays more ideas and merchandise than a trade exposition. Make every issue your buyer's guide. Read the ads as well as the articles. That's reading with your eyes open for business.

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McGRAW-HILL publications

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Used Profitably...

by manufacturers of such widely diversified products as *lawn mowers, food machinery, textile machinery, juke boxes, snow plows, conveyors, air compressors, agricultural machinery, electric fans, bottling machines,* and dozens of others.

Precision machined from solid bar stock in 42 stock sizes for shafts from 3/16″ to 3″ diameters inclusive.

Write for prices and name of your nearest distributor.

—SPS—

STANDARD PRESSED STEEL CO.

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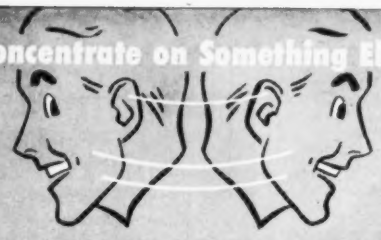
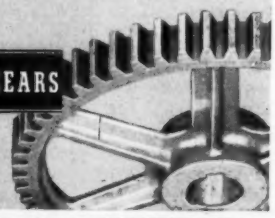
Concentrate on Something Else



One reason why we're still doing business successfully after forty-five years of manufacturing gears of all types for a variety of industries is because we have continuously maintained the policy of making sure that each customer gets exactly the right gear for the job. Since we expect to continue in business for a great many years, it stands to reason that this policy will never be compromised. Therefore, you can turn your gear problems over to us—while you concentrate on something else.

THE EARLE GEAR & MACHINE CO., 4707 Stenton Ave., Philadelphia 44, Pa. Sales Offices: New York City; Youngstown, Ohio.

EARLE GEARS



It's good business to do business with EARLE.

MP

QUALITY GEARS CUT TO ORDER

● MEISEL produces but one *kind* of gears . . . gears constructed for specific jobs. Only through the inherent accuracy of this special designing could such dependability, performance and economy be possible. Tell us what you expect it to do, and we'll show you the *one* gear suited for your job.

MEISEL PRESS MFG. CO.
946 Dorchester Avenue Boston, Mass.

MP

Famous for

● ACCURACY OF THREADS
● LOW CHASER COST
● ALL AROUND DEPENDABILITY

Bulletins available: General Purpose Die Heads, Insert Chaser Die Head, Threading Machines.

H&G DIE HEAD

See our Advt. on Page 297 July 9, 1951 American Machinist

THE EASTERN MACHINE SCREW CORP., 20-40 Barclay St., New Haven, Conn.
Pacific Coast Representative: *A. C. Behringer, 854 N. San Pedro St., Los Angeles California.* Canada: *F. F. Barber Machinery Co., Toronto, Canada.*

ATLANTIC GEARS

SPUR-SPIRAL WORM-BEVEL GEARS GENERATED WITH PRECISION ON MODERN EQUIPMENT

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SEND SAMPLES OR BLUEPRINTS FOR QUOTATION

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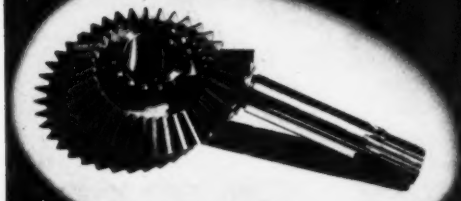
Gears, Good Gears Only, custom made to your specifications by The Cincinnati Gear Company, are always top quality. Their accuracy is built-in by master craftsmen using the latest equipment to deliver long term performance—dependable, maintenance-free service. Electronically tested to assure quiet operation.

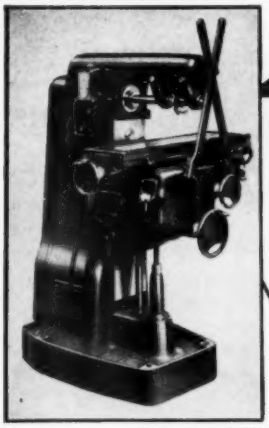
spotlight on quality!



Spur | Worm | Internal | Spiral Bevel
Helical | Herringbone | *Coniflex* Bevel | Spline Shaft

*Reg. U. S. Pat. Off.

THE CINCINNATI GEAR COMPANY
"Gears . . . Good Gears Only"
Wooster Pike and Mariemont Ave. • Cincinnati 27, Ohio



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Featuring:

● Automatic Table Cycle including quick return
● Spindle speeds up to 3500
● Arranged for climb-milling

Working surface of table 35-15/16" x 9-27/32"
Plain and Universal Milling Attachments available
Selector levers for automatic feeds
IDEAL for negative rake milling
BUILT TO ASME STANDARDS
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. . . for precision work

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The cylindrical plungers in the Waltham Sub-presses slide in babbitted bearings. This bearing is tapered on the outside and can be forced downwards, thus reducing the inside diameter to fit the plunger when the latter becomes worn through use. Exact alignment and constant precision can be maintained throughout the life of the die. Write for information about the nine sizes.

Overhang

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HIGH STREET, WALTHAM, MASS.

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LUBRIPLATE LUBRICANT
Saves Gears and Transmissions

So says the AUTOMATIC WASHER COMPANY. "*We have used LUBRIPLATE in our washing machine transmissions since 1933. Our laboratory tests as well as field experience indicate that through the use of LUBRIPLATE we reduce the wear on the gears and prolong the life of the transmission. It has been an important factor in the success of our product.*"

1. LUBRIPLATE reduces friction and wear
2. LUBRIPLATE prevents rust and corrosion
3. LUBRIPLATE is economical to use

Write today for case histories of savings made through the use of LUBRIPLATE in your industry.

LUBRIPLATE DIVISION
Fiske Brothers Refining Co.
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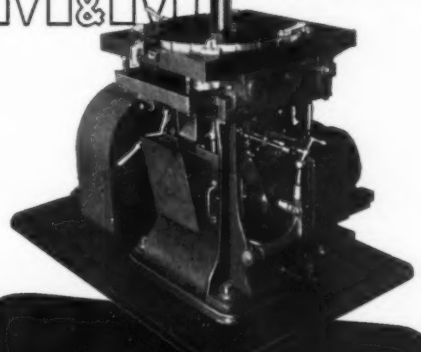
The Different LUBRICANT!

DEALERS EVERYWHERE, consult your Classified Telephone Book

M&M giant keyseaters



M & M Giant Keyseaters, built in a range of sizes, speedily and accurately cut internal keyways or splines in the bores of pulleys, gears, fly wheels or any other machine part. Special fixtures and cutters are available for unusual shaped keyways and taper work. Send us your problems.

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ACROMARK ENGRAVES DIES, STAMPS, PARTS, NAME-PLATES, SIGNS, HOBS, AND MAKES MEMORIAL TABLETS.
ASK ABOUT ACROCEL PORCELAIN ENAMELED PLANT SIGNS CARRIED IN STOCK

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CAST BRONZE TABLETS & SIGNS

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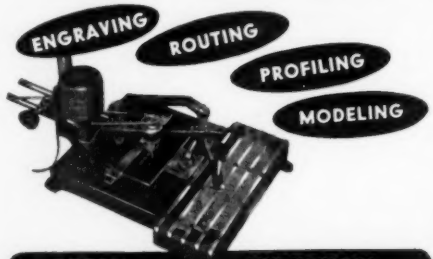
RIVETT **PRECISION TOOLROOM LATHES AND GRINDERS**

SEE FULL PAGE ADVERTISEMENTS opposite "Backlash" in American Machinist describing 10" Toolroom Lathe (9-4-50; 11-27-50; 2-19-51; 4-16-51); 9" x 18" Plain Cabinet Lathe (1-22-51); 9" Swing Hand Turret Lathe (10-2-50; 5-14-51); 8½" x 20" Instrument Lathe (3-19-51); 10" x 24" Universal Hydraulic Grinder (10-30-50; 12-25-50; 2-19-51).

For Complete informative literature on the entire line of Rivett lathes and grinders, write to

Dept. AMM. **RIVETT LATHE & GRINDER, Inc.,** *Brighton 35, Boston, Mass.*



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Special attachments and engineering service available for production work.

FREE—Fact-packed folder. Send for yours today

GREEN **GREEN INSTRUMENT COMPANY**
371 Putnam Avenue, Cambridge, Mass.

Hinged Hammer Moulds

1, 2½ and 5 lb. sizes—order your alloy lead hammer requirements from your machine tool supply house

or direct from:

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GRANT

RIVETERS — PIONEERS in their line—head rivets from smallest to ¾" diameter either by NOISELESS SPINNING or VIBRATING HAMMER method—Sizes to meet all needs—Types include Vertical and Horizontal Multiple Spindles.

Write for literature and don't forget to send samples.

THE GRANT MFG. & MACHINE CO.
85 Silliman Ave., Bridgeport, Conn., U. S. A.

Precision Die Made—Lowest Possible Cost.
DAYTON ROGERS MFG. CO., Minneapolis 7, Minnesota

DRILLING PROBLEMS?

Call *Production Drilling Headquarters* for expert know-how. There's a Leland-Gifford office near you.

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How to Save $1250 a Year

In the average metalworking plant, a ten per cent reduction in accidents per year for each 100 employees means a saving of $1250 a year!

"How to Operate a Safety Program" will tell you how such savings can be made quickly and economically. This eight-page Special Editorial Report concentrates particularly on helping you prevent the accidents caused by carelessness . . . source of 85 per cent of all industrial mishaps. Reprints in any useful quantity are available at 15 cents each. Write to . . .

American Machinist

Reader Service Department
McGraw-Hill Building, New York 18

IVAN is watching you

IVAN is a dyed-in-the-wool Communist. There are only 6 million party members like him in all Russia, yet these Communist brass-hats enforce the iron dictatorship of the Kremlin over *200 million* Russians.

He's sold to the hilt on Red ideas. Which means he's out to get *you*. He believes it's either you or him . . . that the world is too small for both.

Ivan is working hard to beat you down. He has a big head start.

Right now he's got you in a bad spot.

Ivan is afraid of only one thing.

He fears your ability to out-produce him in guns, tanks, planes.

Frankly, he doesn't think you value your free system enough to do it . . . to make willingly the sacrifices he has squeezed out of the Russians.

But he's wrong!

Because you and all of us have set out to build more and better weapons—to do it faster all the time.

We must use every bit of know-how and inventive skill we have to improve our machines and methods—to turn out more and more for every hour we work. Only in this way can we become militarily strong.

But we've got to supply essential civilian needs as well. We can't allow needless shortages to take prices skyrocketing and lower the value of our dollar.

Sure, that means sacrifices for everybody. But doing this double job well is the only sure way to stop Ivan in his tracks—and to save the freedoms which are ours and which he has never known.

FREE... this important booklet tells you how our American System Grew Great

How Americans developed better machines, power and skills to build a great nation . . . Why we have been able to produce constantly more per hour . . . How this has given us the world's highest living standard.

How we can meet today's challenge—Why we must expand our productive capacity . . . supply arms and essential civilian needs, too. Read how this dynamic process works in free booklet, "The Miracle of America," endorsed by representatives of management and labor. Send for your free copy today!

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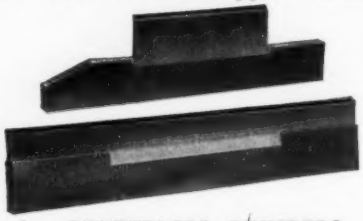
THE BETTER WE PRODUCE
THE STRONGER WE GROW

WILLEY'S
TUNGSTEN CARBIDE
TOOLS

CARBIDE
TIPPED...Work Support Blade



for CENTERLESS GRINDERS

Standard thrufeed and infeed work support blades available from stock. Prices on special blades quoted on receipt of prints.

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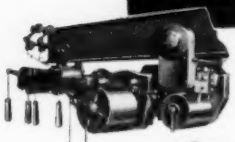

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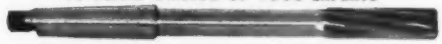

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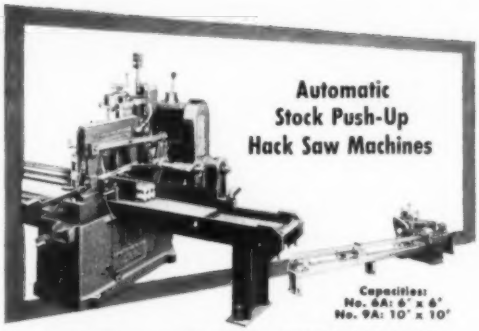

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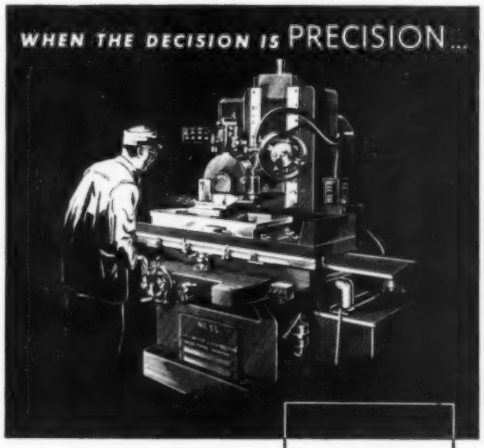

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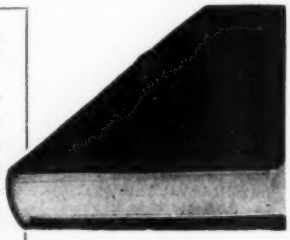

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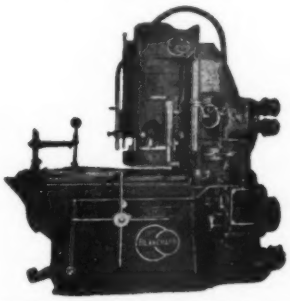

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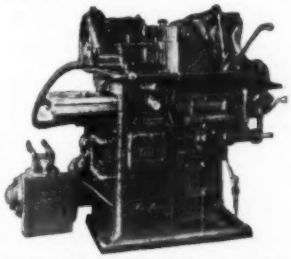

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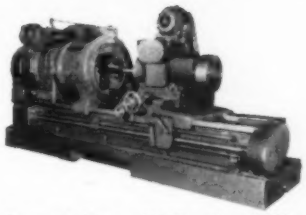
LATHE, TURRET, Warner & Swasey #3A Univ. Grd. Hd. Bar feed, tooling & collets, AC Motor.
LATHE, TURRET, Simmons #2 Vari Drive 220 V.



Sommer & Adams #20A Threading, Hobbing & Boring Machine, swings 36", 42" centers, 18" cross feed, last use threading breech blocks on 105 MM guns.

LATHE, TURRET, Warner & Swasey #6 Grd. Hd. Ram Type, Bar Feed, Motor in base.
MILL, Cinc. Horiz. #2, #3, #4, #5.
MILL, Cinc. Vert. #2, #3, #4,
MILL, Sundstrand #0 Hyd. Rigidmill.
MILL, Cinc. 18" Mfg. Type with Vert. head.
MILL, #14 Cochrane-Bly Vert. Duplex Univ. Shaper.
MULT-MILLER, U.S. Tool #MM-1-6.
MILL, #30H Sundstrand Two Spindle Hyd.
MILL, #1-M Kent-Owens M.D. Plain Horiz.
MILL, PLANER, Ingersoll 36x42x12, 4 heads.
MILLING MACHINE, Kempsmith #3, Horiz. Univ.
MILLING MACHINE, LeBlond #4 Horiz. Univ.
MILLING, Brown & Sharpe #1½ Horiz.
MILLING MACHINE, Kempsmith #2 Horiz. Univ.
MILLING, Brown & Sharpe #2 Horiz.
MILLING MACHINE, Van Norman #2 Duplex.
MILLING MACHINE, Cincinnati #08 Prod., Vert.
MILLING MACHINE, Cincinnati #66 Prod., Horiz.
MILLING MACHINE, K & T #2B, Horiz.
MILLING MACHINE, Nichols Hand Millers.
MILLING MACHINE, U. S. Auto. Prod.
NIBBLER, #2 Savage Roller Die ⅜"x36" cap.
NIBBLER, Gray Turret Type 1¼"x24" cap.
THREADING MACH. Staybolt Lassiter Millholland 1½".
THREAD MILLER, Hanson Whitney 4"x9" Univ.
THREAD MILLER, Lees Bradner #40A Automatic
THREAD MILLER, Plan-O-Mill #3 Planetary Form & Thread Semi-Automatic Milling Machine.
PLANER, Gray 30"x30"x10' A.C. Motor Dr.
TAPPER, W & S #1 Sgle. Spdle.
POWER PRESS, Bliss #164 Open Back.
POWER PRESS, Bliss #3A S.S. Dble. Crank Grd. 45 tons, 4" stroke, 36"x24" Bed Area.
POWER PRESS — Bliss - Consolidated #163 - B Straight Side Dble. Crank, 45 tons.
PRESS, V & O #4 O.B.I. 38 tons.
PRESS, Robinson #5 O.B.I. 88 tons.
PRESS, Federal #2 O.B.I. Grd. 2" Stro.
PRESS, Bliss #18, #19, #20, #21, OBI, A.C., M.D.
PRESS, Toledo 39½ S.S. 440 ton cap. 8" str. bed
PRESS, Waterbury-Farrel High Speed 60 tons #3W.
WHEEL PRESS, Caldwell 200 tons cap. Hyd.
PRESS, Lucas 15 tons Power Arbor M.D.
PRESS, #68 Whitney Deep Thr. 24", foot.
PANTOGRAPH, #1A Gorton M.D. Engraving
PUNCH, Hecker Turret, 6 station, cap. 2½" hole, 16 ga. al., 18" thr., 2" str.
PUNCH, H & J #2 Sgle. End. 24" Thr. 1" thru 1".
PUNCH, H & J #5 Sgle end. 48" Thr. 2" thru 1½".
PUNCH, H & J #6, sgle end. 72" Thr. 1½" thru.
CUT-OFF SAW, Yates-American #M-90.
SAW, Band, Tannewitz #GH-36" High Speed.
SHAPER, Columbia 32" B.G. Crank.
SHAPER, Morton 36" Draw-Cut, 4-Speed.
SHAPER, G & E 24", high duty, back geared, M.D.
SHEAR, Quickwork #A-1 Rotary 80" Throat. 18 ga.
SPRUE CUTTER, Milwaukee 56 tons, 2½" cap.
WELDER, 200 KVA Federal, Projection.
WELDER, 75 KVA Federal, M.D., Spot.

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THE SIGN OF QUALITY—THE MARK OF DEPENDABILITY

PLAIN MILLING MACHINES

No. 1BD Brown & Sharpe, m.d.
No. 1B Milwaukee, m.d.
No. 1M Cincinnati, m.d.
No. 1½, 3 Cincinnati, cone
No. 2 Cincinnati Plain H.P., belted m.d.
No. 2 Rockford, m.d.
No 2G LeBlond, belted m.d
No. 3 Van Norman Duplex, s.p.d.
No. 4 Cincinnati H.P., m.d.
No. 4 Kempsmith Maxi-Miller, m.d.
No. 4 Ohio, cone
No. 5 Cincinnati, rect. overarm, m.d.
No. 5 LeBlond H.D., s.p.d.

THREAD MILLING MACHINES

14"x16" U6 Automatic Hob, m.d.
Hall Planetary, m.d.
4½x12", 6x14", 6x20", 6x48", 6x80" Pratt & Whitney
10x24" Hanson Whitney, m.d., latest

UNIVERSAL MILLING MACHINES

No. 2A Brown & Sharpe, s.p.d.
No. 2 Kempsmith, cone, motorized
No. 3A Brown & Sharpe, s.p.d., p.r.t.
No. 3 Kempsmith, cone

VERTICAL MILLING MACHINES

No. 0B Cincinnati, m.d., latest
No. 2M Cincinnati, m.d.
No. 3, 4 Cincinnati H.P., m.d
No. 2½B, 3B Milwaukee, m.d.
No. 3V Toledo, s.p.d.
No. 5 Brown & Sharpe, cone
No. 6 Backer, cone

MILLING MACHINE ATTACHMENTS

16" Cincinnati Circular Milling Table, p.f.
Kearney & Trecker Attachment for Milling Bridge Reamers, 62" long & 24" wide
1½" Cincinnati Rack Milling Attachment for No. 3 Dial Type Miller
Rack Milling Attachment for No. 5 Cincinnati H.P. Miller
Cincinnati Universal Spiral Milling Attachment for No. 2 Dial Type Miller
16" Kearney & Trecker Rotary Table, p.f.
Cincinnati Universal Vertical Attachment for No. 5 Miller

PIPE MACHINES

2" Bignall Pipe Machine, cone
2" Forbes Type Curtis & Curtis Pipe Machine, m.d.

PLANERS

P10 Coulter Crank Type Shaper-Planer, 1 head, m.d.
20"x20"x5' Whitcomb-Blaisdell Planer, belted m.d., 1 head
24"x24"x5' G. A. Gray Planer, belted m.d., 1 head on cross rail
30"x30"x10' Cincinnati, belted m.d., 2 heads
36"x36"x8' Gray, belt
36"x36"x10' Cincinnnati, belted m.d., 2 heads
36"x36"x10' Niles, 2 heads, belt
36"x36"x16' G. A. Gray, reversing m.d.
36"x36"x18' Niles-Bement-Pond, 2 heads, reversing m.d.
36"x36"x20' Cincinnati, 2 heads, belt
36"x36"x20' Gray, 2 heads, belt
36"x36"x24' Cincinnati, belted m.d., 2 heads
38"x38"x20' Gray Spiral Drive, 2 heads, belt
42"x42"x26' Gray, 2 heads, belted m.d.
48"x48"x18' Detrick & Harvey, 4 heads, reversing m.d.
48"x48"x28' Cincinnati, 4 heads, reversing m.d.
48"x46"x30' Cincinnati, 4 heads, m.d.
48"x48"x32' Niles-Bement-Pond, 4 heads, reversing m.d.
62"x62"x40' Cincinnati, 4 heads, reversing m.d.
66"x60"x40' Niles-Bement-Pond, 4 heads, reversing m.d.
72"x72"x36' Niles, 4 heads, reversing m.d.
84"x72"x20' Niles, reversing m.d.

PRESSES

Chambersburg 30 ton Hypro Pneumatic
Metalwood B33, B45
Springfield No. 1 Straightening Press
Small cam operated Press, made by Swartz Tool Prod.

PUNCHES

No. 2 Hilles & Jones Horizontal Punch, m.d.
No. 2 Niagara Bench Type
No. 6 Long & Allstatter Single End, m.d.
No. 7 and 8 Thomas Vertical, latest
Pedrick & Ayer Pneumatic, 6" throat

SAWS

5" Newton Cold Cut-Off Saw, s.p.d.
Delta Abrasive Cut-off Machine
No. 3 Nutter & Barnes Cold Saws
No. 6 Cochran Bly Cold Saw
No. 13B Espen Lucas Cold Saw, m.d.
Gustav Wagner Cold Saw, m.d.
7½ H.P. Cincinnati Elec. Tool Co. Abrasive Cut-off Machine, type JCAW, model 102

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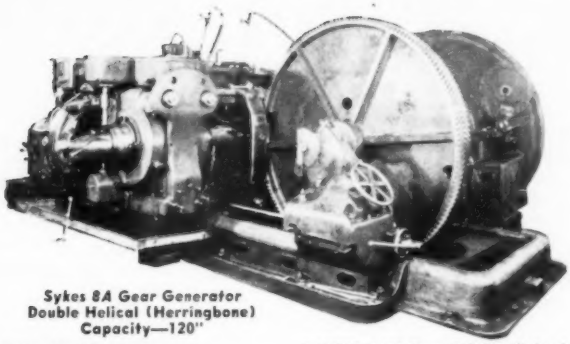

Sykes 8A Gear Generator
Double Helical (Herringbone)
Capacity—120"

BORING MILLS—Horizontal
FRANKLIN 4¾" Bar; table type; M.D.
LANDIS #40, 4" Bar; floor type; M.D.
LODS No. 35 3½" floor type ; Bar
NILES 8" bar floor type, motor drive

BORING MILLS—Vertical
BULLARD 24" Power Rapid Traverse
BULLARD 16" 6-spindle "A" Mult-au-matic;
NILES 36-44" side head; M.D. Late
NILES-BEMENT-POND 144"; hvy M.D.

BROACHES
AMERICAN Mod 6-G Hydr. Rifle Broach
CINCINNATI 1-30 Duplex Vert. Hydr.
LaPOINTE #2L M.D. Late

CRANES
MILWAUKEE 5-ton; spans, 22'2"; 24'; 25'; 36'11"; 37'2"
MILWAUKEE 10-ton ; span, 36'
MILWAUKEE 25-ton; span, 34'4"

DRILLS—Miscellaneous
BARNES No. 420 Deep Hole; late
BARNES R-3 Hydram; hydr.; Inverted; late
BARNES H-2 Hydram; hydr.; M.D.
BARNES 20" 4-spindle; Camel Back; Late
BARNES 24" all geared; Camel Back; M.D.
BAUSH 1½x30" Deep Hole; Late
EDLUND 2B, 3-spindle; 1⅜" Dia.
MOLINE 6-spindle Multiple Hole-Hog; 3⅝" dia.; M.D.
NATCO 2BL Mult. ; Holesteel; PRT; M.D.
NATCO No. 14 Mult. ; Rect. Hd. ; PRT ; M.D.
NATCO D-5 Multiple; adjustable; Late
BODINE #42-20 multi-univ., dial feed; M.D.

RADIAL DRILLS
CARLTON 6'17" plain ; M.D.
CINCINNATI BICKFORD 6'15" Univ. ; M.D.
DRESES 5'15" Universal ; M.D.
NILES-BEMENT-POND 6'15" ; S.P.D.

GEAR CUTTING EQUIPMENT
BROWN & SHARPE #13 Spur Bevel Cutter
BROWN & SHARPE 6-72" Auto. Cutter ; M.D.
CROSS No. 1 Tooth Rounder; M.D.
FELLOWS Nos. 61A, 6Z2, 715, 75, 7, 7A, 75, 72, 77 High Speed Gear Shapers; late
FELLOWS 8-M Red-Liner; M.D.; Late
FELLOWS 12-M Involute Meas. Instr. ; Late
FELLOWS 13-LS Lapper; late
GLEASON 3" & 12" Straight Bevel Gen.; late
GLEASON 10", 11" & 18" Bevel Gear Gen.
GLEASON 24", 37", 77", 96" Bevel Gear Planers; M.D.
GLEASON No. 14 Hypoid Grinder; late
PRATT & WHITNEY 10" Gear Grinder ; late
SYKES #4A gear generator ; M.D.
SYKES #8A gear generator ; M.D.

GEAR HOBBERS
BARBER COLMAN #12 dble. overarm ; M.D.
GOULD & EBERHARDT #24H. Late
GOULD & EBERHARDT #36BM 3 spindle Auto. Rougher; M.D.
KOEFFER WM-11 Auto.; bench type; Late

GRINDERS—Plain Cyl. & Univ.
BROWN & SHARPE No. 1 Universal; late
BROWN & SHARPE No. 5 Plain; cap. 3x18"
LANDIS 6x18" Type C Plain; Hydr.; late
LANDIS 10x18" type C plain Hydr. M.D.
LANDIS 29"x130" centers Plain; M.D.
NORTON 10x72" type C Plain ; Late
NORTON 17x42" centers crankpin; Hydr. Dble. hd.; M.D.

GRINDERS—Miscellaneous
BRYANT No. 3, 5, 16-C-16, 16-CP-16, 24-36" Internal hydr.; Late
GLEASON No. 12 Tool Sharpener; late
HEALD No. 72-A-5 "Gagematic" Int. ; Late
HEALD No. 72-A-3 "Gagematic" Int. ; Late
LEMPCO 22x72" Mod. KG Crankshaft ; Late
PRATT & WHITNEY B 14x36" Hydr.; Late
SHEFFIELD Micro-Form Grinder; late
THOMPSON 6x48" Auto. Rd. Broach; M.D.
VAN NORMAN 666 Crankshaft Regrind
VAN NORMAN 639 Osc. type Radius ; Late

LATHES ENGINE & MFG.
AMERICAN 24"x220" centers ; Timken ; Late
AMERICAN 36"x360" centers; 2 carriages
AMERICAN 36"x33' centers geared ; heavy
HARDINGE T.R.59 Bench type; Late
JONES & LAMSON "FAY" 20x25" Automatic ; M.D. ; Late
LEHMANN 25x96" entr ; TIMKEN ; grd M.D.
LeBLOND 16x36" cent. ; Auto. ; Timken ; late
LeBLOND Mod. 7ACL Crankshaft; M.D.
LODGE & SHIPLEY 24x120" centers, Late
LODGE & SHIPLEY No. 5—24" and 96" centers DUOMATIC; Timken; Late
LoSWING 4x60", 8x24", 8x108"; late
MONARCH 16x28" cent., geared head; M.D.
MONARCH 22x456", 3 carr. CM TIMKEN
MONARCH 14x42" centers "Z" Magnamatic Auto.; TIMKEN; M.D.; Late
NILES 30"x50' Boring "Time-Saver"; Timken; Late
NILES 48"x32' centers Engine; geared; M.D.
REED PRENTICE 16"x24" centers grd ; M.D.
SPRINGFIELD 14"x43", geared ; M.D.

LATHES—TURRET
GISHOLT No. 3, 4, 5 Ram; TIMKEN; Late
MOREY No. 2, 3 ram type TIMKEN

MILLING MACHINES—Plain
CINCINNATI 0-8 Rise & Fall; Late
CINCINNATI 4-48, 4 spindle, Tracer; Late
CINCINNATI # 24 Duplex; SPD
GOULD & EBERHARD 25 Cont. type; M.D.
CINCINNATI No. 4 High Power; TIMKEN; Rect. M.D.
SUNDSTRAND No. 3 Rigidmill; TIMKEN Late

MILLING MACHINES—MFG.
HALL Style D Planetary; Late
INGERSOLL 32x24x16' Planer Type; 2 hds
INGERSOLL 30x24x12' Adj. Rail Slab; M.D.
INGERSOLL 42"x42"x16', 4 heads, Planer Type, Late
SUNDSTRAND Mod 3A Duplex 42" feed M.D.
TAYLOR & FEN M-80 Duplex Spline; Late

MILLING MACHINES—Vertical
CINCINNATI 0-8 Mod EA Automatic PRT; M.D.; Late
CINCINNATI No. 28-60 Hydratel; tracer control; Late
SUNDSTRAND Mod. 3A Rotary Rigidmill

MILLING MACHINES—Thread
LEES BRADNER HT 12"x36" M.D. Late
MOREY 12x30", 12x60" centers; late
PRATT & WHITNEY 4½x12 Mod. C; late
PRATT & WHITNEY 6x132; M.D.

PLANERS
BETTS (CONSOLIDATED) 84"x92"x16' 4 heads PRT Box Table ; DC Riversing M.D.
BETTS (CONSOLIDATED) 108"x84"x44'; 4 heads ; PRT ; Box Table ; M.D.
CLEVELAND 48"x48"x12' Openside; AC; M.D.
DETRICK & HARVEY 48"x48"x16' hydr. table feed ; 4 heads ; M.D.
LIBERTY 48"x48"x16' 4 hds. Double housing; vari-voltage
LIBERTY 72"x48"x20' 4 heads; Convertible openside vari-voltage drive; late
NILES 108"x84"x42' 4 heads; Rapid Traverse; Box Table DC M.D.
NILES-BEMENT-POND 72"x72"x30' 4 hds.; Rapid Traverse; M.D.
SELLERS 60"x60"x12' 4 heads vari-voltage dr.; PRT
WOODWARD & POWELL 54"x54"20'; 4 heads; M.D.

SAWS
ESPEN LUCAS No. 670-30" cap Hydr.; Late
HELLER Model SS-1, 6¾" Cap Cold Saw;

WATCH THIS PAGE

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SHAPERS—SLOTTERS
CINCINNATI 16", Heavy; PRT; Late
LeMAIRE 18" Vertical Hydraulic ; Late
PRATT & WHITNEY 6" Vertical; M.D.
GOULD & EBERHARD 32" "Invincible";
LYND FARQUHAR 26" Openside; M.D.
NEWTON 15" Slotter; M.D.

PRESSES
BESCO Mod. 21 Incl. 40 ton, 3" stroke NEW
BIRDSBORO 325 ton Vert Hydr; Late
BLISS No. 410A Toggle Drawing; tie rod; steel gearing
CHAMBERSBURG Horiz. Straightening; 24" str.; M.D.
BLISS No. 3½A geared toggle; dble. acting
GLEASON 15", 25" Quenching; hydr.; M.D.
NIAGARA No. 512 DG tie rod; 282 tons; M.D.
UNITED ENG. 500 ton hydr. forging

MISCELLANEOUS
ACME 2" forging, upsetting; late
AJAX 3½" forging, upsetting; M.D.
BAKEWELL No. 1, IR Precision Tapper
BAKER #5 Keyseater; motor drive
BARNES No. 172, 214 Honing; hydr.; Late
DeLAVAL No. 194 Coolant Clarifier; Late
FISCHER No. 1, No. 2 Oil Groover; Late
FOSTER 4x36" centers; Superfinisher; Late
GROB OS-20 Metal Band Saw—Filer; M.D.
GROB NS-24 Band Saw ; M.D. ; Late
LANDIS 2" agle. Dble. Spdle. Threaders; M.D.
MANVILLE 2C Auto Screw Slotter ; M.D.
MANVILLE No. 2 Slotters; Late
MANVILLE No. 3 Trimmers; Late
MANVILLE No. 2 DSOD Readher; M.D.
MANVILLE 1A DSSD Heater; M.D.
MANVILLE No. 3 Rehaaders; Late
LeBLOND #2 Barrel Lapper; M.D.; Late
US TOOL 810-B Cutter Reliever; Late
NORTON 2F, 26F Lapping Machines ; Late

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#00 Roller Bearing Turret Formers, serials 10533, 10531, 10530, 10529, 10528, 10527, 10241, 7318, 4463, with new Turner Uni-Drive. Price, each **$1775.00**

#00 Cutoff, serial 7760. Price **$475.00**

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#0, serials 5407, 5209, 5089, 5058, 5057, 4964, 4746, 4497, 3692, with new Turner drive. Price, each **$2475.00**

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#2, high speed, serial 6350, Madison Kipp oil system, with new Turner Uni-Drive. Price **$4275.00**

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#2G, serial 4577. Price **$3775.00**

#6 Brown & Sharpe, 2" capacity (2).

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LATE MODEL MACHINE TOOLS . .

AUTOMATICS

1-1/16" Model A Cleveland, 1942.
20"x25" Fay Automatic, 1942.
No. 3-8 Cece ⅝" Cap. 1942.

DRILLS

No. 4BM Fosdick, 1942.
No. 2 LMS Leland Gifford Hyd. 1942.

GEAR EQUIPMENT

No. 645A3 & 61A Fellows Gear Shaper, 1944.
No. 6 Gleason Revacycle, 1940.
No. 6 Gleason Gear Tester, 1942.
8" Red Ring Internal Shaver, 1942.
15" Red Ring Lapper, 1942.
Red Ring Universal Tester, 1942.

GRINDERS, CYLINDRICAL

14"x168" Norton Plain Type C, 1942.
14"x48" Norton Pl. Type C, Hyd. 1941.
14"x36" Landis Univ. Type C, Hyd. 1942.
12"x36" Norton Universal, 1941.
10"x18" Norton Type C Plain, 1942.

GRINDERS—INTERNAL

No. 24-36 Bryant, 1943.
No. 16 CP 16 Bryant, 1942.
No. 16-18 Bryant, 1942.
No. 172 Heald Hyd. Gap, 1940.
No. 81 Heald Plain Hyd. 1940.
72A3 Heald Plain Hyd. 1942.
No. 50 Heald Hyd. 1943.

GRINDERS—THREAD

No. 35L Excello Precision, 1943.
No. 31 Excello Precision, 1940.

GUN BARREL MACHINES

No. ½B x 50 P&W Reamer, 1942.
No. ½Bx30 P&W Reamer, 1942.
No. ½B x 50 P&W Rifler, 1942.

LATHES—ENGINE

20"x240" LeBlond, 1941.
20"x72" Reed-Prentice, 1942.

LATHES—PRODUCTION

No. 4D Potter & Johnston/ 1941.
No. 12 Gisholt Hydraulic, 1943.
No. 10 Sundstrand Automatic, 1943.
No. 3 FU Foster "Fastermatic", 1942.
14"x42" Monarch "Magnamatic", 1941.
Line Carbo-Matic, 1942.
LeBlond Multi-Cut, Late.
No. 4-14 Le-Swing, 1941.

LATHES, TURRET

No. 3 Gisholt Universal, 1942.
No. 5 Gisholt Universal, 1942.
No. 4 AR Libby Universal, 1942.
No. 2 W & S Simplified, 1941.

MILLS, PRODUCTION

No. 34-36 Cincinnati Hydro, 1942.
No. 2-20 Kent Owens, 1942.
No. 1-14 Kent Owens Hyd. 1942.

MILLS, THREAD

6"x9" LT Lees Bradner, 1942.

MISCELLANEOUS

48"x½" Niles Plate Straightener.
No. 616 Cleveland Rigidturner, 1942.

SHAPERS

20" Cincinnati Plain, Late.
6" Pratt & Whitney Vertical, 1942.

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No. 7-J Bullard, 8 spin.
ANGLE ROLLS, 2"x2"x½" H. & W., '42
AUTOMATIC, #2G Brown & Sharpe 1½" 1942
BOLT THREADER, 1½" Williams Reliance
BORING MILL, 100" Cinci. Massive, 7 Hds., M.D.
BORING MILL, 72" N.B.P., P.R.T., M.D.
BORING MILLS, 3½" & 4" bar Landis Floor (3)
4½" bar Niles table, Dual Control, 3" bar Univ.,
BORE-HONE, Barnes, 10 stroke, 6" bore, '42
BRASS LATHE, 21" Acme, Late, Hardened Ways
DRILL, 25" Weisel, Tapping, M.D.
GEAR GENERATOR, 3" Gleason, Late
GEAR HOBBER, 36H Gould & Eberhardt
GEAR HOBBER, #12 Barber Coleman
GEAR PLANER, "14" Rienecker, Bevel
GEAR SHAPER, No. 75 Fellows High Speed
61A, 64 & 64A, 6 Fellows
GRINDERS, 20"x120" Landis, Cyl., Hyd., AC
GRINDER, 16"x48" Cinci., Cyl., M.D.
GRINDER, No. 6-T Sellers, Tool, '42
GRINDER, No. 16Y26 Bryant, Int., 1943
GRINDER, No. 174 Heald Gap, Int. 54" sw., '42
GRINDER, No. 72A5 Heald Internal, 1943
GRINDER, No. 75A Heald, Int. Hand Feed
GRINDER, Micro-Internal, Large
GRINDER, SURFACE, 14"x36" P. & W.
GRINDER SURFACE, 13"x48" Hancott Vert.
Spin. No. 16 Blanchard, 26" Chuck
GRINDER, UNIV. 12"x36" Thompson M.D.
LATHES, 50"x15' Cen. Niles, blocks to 68", M.D.
48"x20'6" cen. Simmons, like new '42
LATHE, 42"x31' cen. Putnam Grd. Hd.
32"x25' cen. Sommerfeld, 2 T.A., 2 carr., '42
22"x243½"x48" cen. Skoda, New
20"x48" cen. American, T.A., (2)
14"x6" Hendey T.A., M. in base
TAPPERS, No. 1 & 2 Bakewell (4)
TURRET LA., No. 3AL Gisholt, 6½" hole in spin.
26" Libby 10C" 4½" cpty.
No. 1R Foster Univ., 2" cpty. (2)
No. 2R Foster Univ. 3½" cpty. Bar
THREAD MILLER, 12"x60" Morey Shields, '42
MILLER, UNIV., No. 2A B. & S., M. in base,
Timken Nos. 2 & 3 Cinci. Pl. Cone Motorized
MILLERS, HORIZ., No. 4 Cinci. High Power
MILLER, HORIZ., No. 2 Heavy K.&T., M-in-base
PIPE THREADER, 2" Landis, AC, M.D.
PLANER, 48"x36"x8' Cinci. 4 Hd., Box, PRT,
Force Feed
RADIAL DRILL, 8'16" col. Amer. Trip. Purp. M.D.
SHAPER, 24" Stockbridge, gear box M.D.
SHAPERS, 24", 20" & 16" G. E., AC, M.D.
22" & 16" Hercules, Univ., New
36" Morton, Draw-Cut M.D.
SLOTTERS, 20"—24" & 10"—12" Dills, M.D.

BENNETT MACHINERY CO.

375 Allwood Road, Clifton, N. J.
Off Route S-3, Phone Prescott 9-8996
New York Phone: LOngacre 3-1222

Latest Types — Guaranteed Machine Tools 1941-1950 Models

BROACHING MACHINES

CINCINNATI: 2-30 Vertical Broach, 2 ton, 36" stroke

CAM MILLERS & GRINDERS

VAN NORMAN: Contour Miller 10CT
MOREY: 12M 2-Spindle Profiler, 12¾"x15" table

DRILLING MACHINES

LELAND-GIFFORD: No. 2LMS Deep Hole
BARNES: 2011¼ 2-spindle on 3-spindle base
BAKER: 30HO 2-spindle Inverted, hydraulic, deep hole, 4" dia. x 52" stroke
BAKER: 217 Upright Heavy Duty, 2" capacity
FOSDICK: No. 4BM Upright, High Speed
PROVIDENCE ENG: FV-6 Sensitive 6 motor-driven spindles, ⅜" capacity
PRATT & WHITNEY: ½B x 50 Deep Hole Reaming Machine
ALLEN: #2 High Speed
ARCHDALE: Radial, all sizes (New)

ENGRAVING MACHINES

DECKEL type—3 dimensional (New)
GORTON: 3U & 3Z, 2 dimensional
GORTON: 3B, 3 dimensional

GEAR CUTTING MACHINES

BARBER-COLMAN: No. 3 Hobber
BROWN & SHARPE: No. 6 Gear Cutter, 72" diameter, 13¾ D.P. capacity
FELLOWS: 61A Shaper, 18" dia. capacity
FELLOWS: 64A Shaper, 18" dia. capacity
FELLOWS: 72 Shaper, 7" dia. capacity
FELLOWS: Straight Line Generator, 3" dia.
GLEASON: #12 Rough & Finish Generator
GLEASON: 3" Straight Bevel Gear
HAMILTON: No. 1 Hobber, 6" diameter
SYKES: Gear Shaper 14" external, 20" internal
SYKES: Rack Cutting Machine 24" long (New)

GEAR AND SPLINE GRINDERS

PRATT & WHITNEY: 10" single and double wheel, hydraulic feed
GEAR GRIND MACH: GG-19, 10"x24" Hydr. Spur Gears and Splines, also internal
GLEASON: No. 17 Spiral, Zerol & Hypoid, capacity 23½ P.D.

GEAR FINISHERS & TESTERS

FELLOWS: 8LSI and 13LSI Gear Lappers. External & Internal Spur and Helical
FELLOWS: No. 12-C Spacing Tester
GLEASON: No. 4 and No. 8 Bevel Gear Testers, Hand and Power Operated
GLEASON: 3" Bevel Gear Tester

GRINDERS—CYLINDRICAL

BROWN & SHARPE: No. 23, capacity 10"x 48", plain
BROWN & SHARPE: No. 10 capacity 6"x18" plain.
CINCINNATI, 6"x18" Hydraulic, plain
CINCINNATI: 10"x36" Hydraulic, plain
LANDIS: 16"x32" Type "D" Crankpin, Hydraulic
VAN NORMAN: #866 Crankshaft Regrinder
NORTON: 6"x18" plain
NORTON: 10"x18" plain
NORTON: 10"x18" 45° angle wheel head

GRINDERS—GEAR & SPLINE

PRATT & WHITNEY: 10" single and double wheel, hydraulic feed
GEAR GRIND MACH.: GG-19, 10"x24" Hydr. Spur Gears and Splines, also internal
GLEASON: No. 17 Spiral, Zerol & Hypoid, capacity 23½ P.D.

GRINDERS—INTERNAL

BRYANT: No. 5Y Internal
BRYANT: 112 Universal, Hydraulic
BRYANT: 16C16 Hole, Hydraulic
HEALD: 70A Plain
HEALD: 72A3, 72A5 Plain and Univ.
HEALD: 72A3 Sizematic Centerless
HEALD: 72A5 T-bed, Universal

GRINDERS—RADIUS

VAN NORMAN: No. 73, 639, 649
VAN NORMAN: No. 3½ Universal

GRINDERS—SURFACE

ARTER: A-1—8" Rotary
ARTER: A-3—12" Rotary
THOMPSON: 8"x12"x18" Type B
HEALD: 6" Rotary
HEALD: No. 22 Rotary—12" Chuck
GARDNER: 120A Opposed Head Disc, 20" dia. abrasive wheels and 34" dia. rotary work carrier

GRINDERS—THREAD

EXCELLO: No. 31 external, dia. 5"x18" centers
EXCELLO: No. 33 external, dia. 8"x18" centers
JONES & LAMSON: TG-1245 External, 12" dia. x 45" centers, with additional capacity if required

HONING MACHINES

BARNES: No. 306H Vertical, 24" Stroke
MICROMATIC: H-510 Double End Horizontal
MICROMATIC: H-2 Single End Horizontal, 2-spindle, ¼" to 1" dia. capacity

LAPPING MACHINES

FELLOWS: 6LSI and 13LSI Gear Lappers
NORTON: No. 26 Hyprolaps
NORTON: 2F x 40" Diameter
SCHRANER: Model A External Cylindrical Lapper—6 heads

LATHES—PRODUCTION

LIPE-ROLLWAY: 12"x30" Carbomatic, hydraulic feed
LODGE & SHIPLEY: No. 3A Duomatic
MICHIGAN: #1708 and 1712 Relieving
MONARCH: 24"x60" Geared Head
BLOUNT: HS Polishing, 12"x48"
WILLSON: 15"x48" Geared Head Motor Driven (New)

LATHES—TURRET

GISHOLT: #2L Saddle Type, Extended bed, 24" extra length
HERBERT: Turret Lathes, all sizes (New)
WEBSTER & BENNETT: Vertical Turret Lathes, 36" and 60" dia. (New)

MILLING MACHINE

BRIDGEPORT: Vertical Miller, PF
CINCINNATI: 2-spindle Vertical Hydrotel with two rotary tables of 36" dia.
CINCINNATI: No. 4 Vertical
SUNDSTRAND: No. 0 Rigidmil
MOREY: 12M 2-spindle Profiler, 12¾" x 15" table
TAYLOR-FENN: M-80 Duplex Spline
TAYLOR-FENN: Vertical 6"x21" table with power feed, high spindle speeds
RICE-BARTON: Duplex Spline
REED PRENTICE: #5 Vertical 16"x60" table
VAN NORMAN: Contour Miller 10CT

SAWS & CUT-OFF MACHINES

MOTCH & MERRYWEATHER: No. 3 Circular Saw with auto. stock feed
RUSSELL: 9½" cut-off Saw with Auto. Stock Feed (New) Hydraulic
CAMPBELL: No. 425 Cutalator Abrasive Cut-Off, 4½" dia. capacity
WILLIAMS: 10" Pipe & Tube Cut-Off

THREAD MILLERS & TAPPERS

HALL PLANETARY: Model "D" Thread
LEES-BRADNER: LT 6"x36" Thread
LEES-BRADNER: 40A Thread Miller
MURCHEY: No. 22 Tapper, Horizontal, ½" to 2½" dia. capacity
NATCO: Vertical Tapper 16 spindle
PRODUCTO: Hand Tapper

TOOL SHARPENERS

OLIVER: 2A Face Miller Grinder
OLIVER: 10" Tool Bit-Template
FELLOWS: Flat Top Helical Gear Cutter
RANSOM: 2-Wheel Grinder 3 HP
RUSSELL: 40" Saw Sharpener (New), Automatic Indexing

MISCELLANEOUS

BAR POINTER & CHAMFER: Kent 3¼"
CUT-OFF: Campbell, Abrasive 425 Cutalator, 4½" dia. capacity
CUT-OFF: Pipe & Tube, 10" Williams
DIE SINKER: Reed Prentice No. 5, 16" x 60" table
LATHES: Blount Polishing 12"x48"
PRESS: Screw, Gen. Flex. 3 ton
RACK CUTTING MACHINE: Sykes 24" long (New)
RIVETER: Gen. Engr. 24" throat
TEST STAND: Denison 918-AM Hydraulic
PUNCH SHAPER: Sentinel Shrewsbury (New)

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Machine Tool Engineers since 1919

75A WEST ST. **Phone: HAnover 2-4520** *Cable Address:* "TRIMACTOOL" **NEW YORK 6, N. Y.**

MULTIPLE SPINDLE DRILL

2 Baush 45 spindle, rectangular head, hydraulic feed to head. 15 H.P. motor drive. 2 H.P. hydraulic unit. Now has 13—#2 M.T. spindles. T slotted base, 36" dia. rotary table. Late type, excellent condition.

Abrasive Cutoff, #213 Campbell, 7½ H.P., late.
Automatic, 0G Brown & Sharpe, M. in base.
Bending Roll, 8' x ½" Newbold, pinch, all steel, 1940.
Boring Mill, 60 Gisholt, vertical, 2 hds.
Boring Mill, 44" Bullard Maxi-Mill, Vert. PRT, M.D.
Boring Mill, 3½" N-B-P, horiz. table type.
Boring Mill, 62" N-B-P, vertical, 2 hds., PRT, M.D.
Boring Mills, 54" Colburn, vertical, 2 hds., M.D.
Boring Mills, 36", 24" Bullard vert. turret.
Drill, 4 spindle, #2KH Allen, ½" chucks, late.
Drill, 3 spindle, #2MS Leland Gifford, Mtr. Spdles.
Drill, Radial, 6' N-B-P "Rightline" M. on arm.
Drill, Radial, 6' Dreses, gear box, M.D.
Drill, Radial, 8' Western, gear box, M.D.
Drill, Multiple, 45 sp. #2 Baush hydraulic.
Gear Hobber, #36H Gould & Eberhardt univ.
Gear Lapper, Type 10LS Fellows, 1942.
Grinder, Cylindrical, 5 B & S, 3"x18", 1942.
Grinder, Surface, 8"x54" Thompson, M.D.
Grinder, Surface, #34 Abrasive Vert., '41.
Grinder, #5 Bryant, Internal, late
Lathes, Duomatic, #3A Lodge & Shipley, 171" c.c., double carriage 1942.

For: Quality and Integrity!!

Get the best! Good machinery, properly reconditioned and fully guaranteed. Here are a few representative items from stock.

Lathe, 68"x24' Niles, grd. hd., M.D.
Lathe, 54"x20' Johnson, taper, M.D.
Lathe, 36"x30' Putnam, grd. hd., M.D.
Lathe, 24"x9' c.c. Reed-Prentice, grd. hd.
Lathe, 16"x8' American, taper, M. in base.
Lathe, Automatic, 12"x24" Lipe-Carbo.
Lathe, Production, 8"x60" Lo-Swing, late.
Miller, Production, #1-12 Cincinnati, 1942.
Miller, Universal, #4 Cincinnati, Hi-Power, M.D.
Miller, Plain, #1½B Milwaukee, M.D.
Miller, Vertical, #14 Cochrane Bly, slot. attach.
Planer, 36"x36"x12' Cincinnati, 2 hds., M.D.
Turret Lathe, #2G Morey, bar, collets, 1942.
Turret Lathe, #2 Bardon & Oliver, 1943.
Welder, 50 KVA Acme air-press, spot, timer, late.

PIPE THREADERS: 4—#8R Oster "Rapiduction" 8" cap. M.D., 1943
1—8" Landis, 4½"-8" cap., AC M.D.
2—6" Landis, 2½"-6" cap., AC M.D., latest type.

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BORING MILLS
#DB102 EXCELLO DOUBLE END SIX SPINDLE
#49 Heald Single End Borematic

GEAR MACHINES
#36BM 3 spindle Gould & Eberhardt Bevel & Spur Gear Rougher—1941
#G96 Gould & Eberhardt Gear Hobber
#12—12" Gleason Two Tool Straight Bevel Gear Rougher

GRINDERS—CYLINDRICAL
10"x18" Landis Type C Hydraulic—1940
10"x18" Norton Type C Hydraulic—Reciprocating Attachment—1944
6"x18" Norton Type C Hydraulic—Reciprocating & Shoulder Attachments 1941
18"x120" Norton Plain

GRINDERS—INTERNAL
#72AS Heald Plain—Bridge—1942
#73 Heald Airplane Cylinder and Sleeve—1942
#81 Heald Plain Chuck—1941
#16A Bryant—1941

GRINDER—UNIVERSAL
12"x36" Cincinnati Filmatic Bearings

GRINDER—THREAD
Model TG-615 Jones & Lamson Automatic (Several) 1941

GRINDER—MISCELLANEOUS
#87 Wickman High Precision Profile Grinder—1945

HEADERS
#250F Manville DSSD—1944
#2 Manville DSSD
#00 Waterbury Farrel High Speed SSSD
#00 Waterbury Farrel DSDD
#2C Manville SSSD Ball
#5 Manville SSSD Ball
#188C Manville SSSD Ball

LATHES
8"x84" Seneca Falls Lo-Swing (2)—1941
8"x132" Seneca Falls Lo-Swing
26"x33' Swift Geared Head—1941
#1 Lodge & Shipley Duomatic

MILLERS
24" Cincinnati Automatic Duplex (2)
48" Cincinnati Automatic Duplex
#34-36 Cincinnati Plain Hydromatic (2) tracer controlled—1942
#12-48 Kearney & Trecker Simplex—1942
#1-12 Cincinnati—1939
#08 Cincinnati Horizontal—1941
54"x18' Ingersoll Slab Miller
Cincinnati 4-spindle 360 deg. Automatic Vertical Profiler—1943

PLANER
120"x96"x20' Cincinnati Heavy Duty Box Table

PRESSES
100 ton HPM Vertical Hydraulic Fastraverse—1946
#304 Bliss Straight Side (2)

SCREW MACHINES
#2G Brown & Sharpe—1941
⅞" 4 spindle Conomatic

TURRET LATHES
#1L Gisholt Universal Geared Head—1942

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GRINDERS
No. 1 B & S Univ., Equipped, Late
No. 2 B & S Univ., Equipped, Late
Wicaco Internals, Late
#4H Landis, 4"x12", Equipped, Late
#22 Heald Rotary Surface, 12" Chucks, Late
PRESSES: Bliss #101S, 102S Auto. Comb. Feed, 4 & 5 Stations Draw ¾"—1¼"deep.

TURRET LATHES
No. 1 B & S Hand Screw, ⅝", M.B., Late.
No. 2 B & S Hand Screw, 1", P.F., M.D.
No. 2B Simmons Wiere Spd., M.B., Late.
No. 3B N.B. Chuckers, 10½", M.D. Equipped, S.S.
Gridley Auto., 4½", Bar Feeds, M.D. Equipped, S.S.
Conomatic 4 spindle, 4½", 1943, Equipped

We purchase entire plants. Send us your surplus list of equipment.

MODERN MACHINES

#40 Landis Floor Type Horizontal Boring Mill
#35 Landis Floor Type Horizontal Boring Mill
6-D Potter & Johnson Automatic Chucking Machine
#35 Excello Thread Grinder
#61A Fellows Gear Shaper
#1A Warner & Swasey Chucking Machine
#30 Waterbury Farrell Thread Rollers
#0 Brown & Sharpe Automatic with Turner Drives
#3 Barber Colman Hobbing Machine
G1-A Acme Gridley 1½ Automatic Screw Machine
8 Spindle 1⅝" Conomatic, late type

HAZARD BROWNELL MACHINE TOOLS, INC.
350 Waterman St. Providence, R. I.

SOME LATE MACHINES STILL AVAILABLE

BORING MILLS

Bullard 24", VTL New Era
Cleveland 2½" Bar Cap.
Giddings & Lewis No. 0, 3" cap.
Giddings & Lewis No. 32, 3⅜" cap.
King 42" Vert. 2 rail heads
Niles-Bement-Pond 4" Bar
Niles-Bement-Pond 4½" Bar
Niles-Bement-Pond 60" Vert.

DRILLS AND RADIALS

Bausch Multi-spindle
Bausch Radial Drill & Tapper
American 6'x15" Univ.
Buffalo #2 Motor Spindle
Cincinnati Bickford 6'x13" col.
Foote-Burt #25
Walker-Turner Radial. 2½'
Leland Gifford 2LMS (3)
Natco Multi-spindle

ENGRAVERS

Auto Engravers Bench Type
Deckel GK2 Type 3 Dimensional, New
Gorton #1A 2 Dimensional
Gorton #3B 3 Dimensional
Gorton ME, 3U

GEAR EQUIPMENT

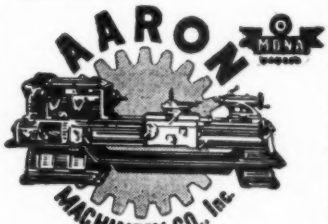
Barber-Colman #12 Hobber (2)
Brown & Sharpe #13 Cutter
Fellows High Speed Shapers 712, 72, 725, 71
Flather 72" Cutter
Gleason 3" Straight Bevel Generator
Gleason #4 Angular Bevel Tester
Gleason #2 Surface Hardener
Gould & Eberhardt 36" Cutter
National Broach Red Ring Lapper, Shaver
Schuchardt & Schutte #1 Hobber
Fellows #20M Redliner

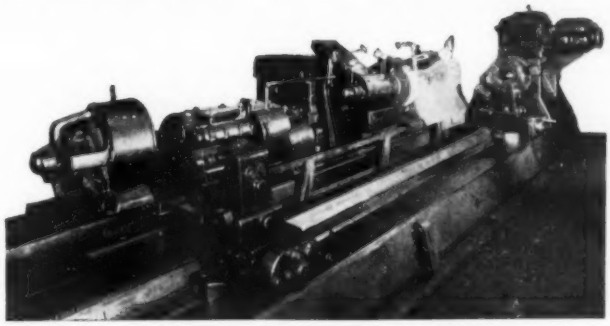
GRINDERS, MISCELLANEOUS

Bryant #5 Internal
Covel #91A Univ. Tool & Cutter
Grenby Int. 1G-12, G2
Heald #73 Internal centerless
Heald #81 Internal Gagematic
Heald 72A3 Int. Centerless Sizematic, #1 Tool
Landis 12"x36" Univ., Latest
Landis 6"x30" Type C Cyl.
Majestic Internal
Norton 6"x18", 6"x30", 10"x18" Type C cyl.
Norton 14"x48" Type C Univ.
Norton Roll Grinder 50"x28'
Oliver #510 Drill Pointer, Sellers 4G, Black Diamond
Port Cable Belt WGB, G8 Grenby Int.
Pratt & Whitney Contour
Pratt & Whitney Radius #R6, K.O. Lee Tool
Van Norman #666 Crankshaft
Vernon Tool & Cutter
Wicaco Internal

GRINDERS, SURFACE

Abrasive 3B 8x24", #33, #34 Vert.
#10 Blanchard 16" Chuck
Blanchard #16, 30" Mag. Chuck
Brown & Sharpe #2 Mag. Chuck
G & L #45 12"x24" Hyd. Feed, #5, 10"x36"
Heald 22—12" chuck, Arter 12"
Norton 6"x18" Hyd.
Norton 10"x36" Hyd.
Pratt & Whitney 12x36" Vert.
Reid 11x36 Motor in Base
Thompson Hyd. 6x12x18"





Norton Roll Grinder 50" x 28' (actual photo)

LATHES

Bertram 27"x8' CC
Lodge & Shipley #3 Duomatics
Hardinge Precision 9", 1" Collet Cap., Rivett
Hendey 12"x42" Geared Head Late
Hendey 14" Yoke Head Lathes
LeBlond Regal 10"x3' bed
Lipe-Carbo 12x18" (2)
Monarch 10"x20" EE Latest (3)
Monarch 12"x30" CKK Late (2)
Putnam 36"x22'
Putnam 42"x17'
Sebastian 12"x4' G.H.
Wickes 32"x35' Geared Head
Sundstrand 8x15"
Sundstrand 15" Stub

MILLS, PLAIN, UNIVERSAL & PROD.

Archdale Plain, 14", Prod.
Brown & Sharpe #000, 21
Burke #4 Plain & Univ. Vert. Hd.
Cinn. 08 PL—Rise & Fall, Cinn. 1-12
Cincinnati, 1 M Univ. #2 Dial Type
#3 Cinci. High Speed Dial Type
Kent Owens 1V, 1M
Simmons Micro-Mill
Sundstrand 00, Rigidmil
118 Van Norman, Prod.
6"x20" P&W Thread Mill
Van Norman #2 Universal

MILLS, VERTICAL

Archdale Vert. 15" Rot. Table
Brown & Sharpe #3 single pulley drive
Cincinnati #4, 08 Vert. #2, 3, SPD
Morey #12M Profiler, 2 sp.
Pratt & Whitney Profiler 12B, 2 SP

PRESSES

Bliss 304A 4" Str.
Bliss 645, 650 Hi-Production Presses
Bliss 18, OBI, 58, 62, 162 OB
Bliss 4½ Double Action, Roll Feeds, Cam (2)
Bliss #78½, 330 Ton, SS, Bliss 74½
Bliss 3½A Double Action Toggle
Ferracute EG54, 400 Ton Knuckle
Niagara Herning, 15 Ton
Niagara A1¾, O.B.I.
Toledo 400 Ton Knuckle Joint #663
Toledo 29 Double Action Cam
V. & O. #102 O.B.I. Reducing

TURRET LATHES

Acme 6W Fox 2 9/16" Cap.
Brown & Sharpe, #1, 2 Hand, #10, 11
Denver, 6, 2" Shell Turret (3)
Foster #3B 4½" Cap.
Gisholt #4 Bar Feed, Late.
Jones & Lamson 2½" Saddle Univ. Late
Libby #4R 2" Cap. Univ. Late
Morey #2G Late
Oster 601 WD. #2 Simmons Microspeed
Warner & Swasey #1A, 2A
Warner & Swasey G.H. #5 Univ., Late
Warner & Swasey #2, Late

HYDRAULIC EQUIPMENT

SELF CONTAINED PRESSES

500 ton Shaft Straightener 24' Long Bed. Watson Stillman
125 Ton Southwark Press, Bed 96"x30". 30" stroke, 2 to 4 ft. opening
80 Ton Wilson Press, 51"x24" Platen, 11½" St. 13" opening
50 Ton William & White, 20" St. 54"x 20" Bed—24" opening
50 Ton Stokes Molding Press

MISCELLANEOUS PRESSES

300 Ton Watson Stillman 24x20" Platen 11" St. 21" opening

All Hydraulic Equipment is completely engineered and checked by a competent staff, thus assuring reliability. Send us your Hydraulic problems.

NEW IN STOCK

Air Hydraulic Presses — Arbor Presses #6C Famco — Band Saws Kalamazoo — Famco 6x12"—Drill Presses all sizes—Hydraulic Press Northern 20 Ton—Injection Molders, 1 ounce—Power Presses, OBI, 1, 4, 4½, 5, 7½, 10, 15, 20, 30 ton —Shaper 7" Amco, 8" Shaperite—Shaper Sheldon 12"—Shears, Foot 22" to 8', 16 & 18 ga.—Shears, Power 3'x18 gauge to 10' x 10 ga.—Welders, Arc, Seam, Spot all sizes—Vert. Milling Attach. Halco H.S. Motors Grinders, Buffers, all sizes.

MISCELLANEOUS

Automatic, Cleveland Model B 1 1/16"
Automatic B & S #00G
Automatic 4 Sp. 1½ Conomatic
Band Saw: DoAll Zephyr 36"
Band Saw: #8 Marvel
Filers—DoAll Band Filer
Filers—Grob Band Filer
Hacksaw: Peerless 6"x6"
Hacksaw: Racine 10x10" Hyd.
Honer: Micromatic #H-1
Keyseater: Davis, Baker, M & M
Shapers: 24" Rockford, 24" Cincl., 28" Gould & Eberhardt, Many Others
Tappers: #1 Bakewell, #3C Haskins
Vertical Shaper: Pratt & Whitney 6" Model "B" 1941
Welder: 50 KVA Eisler Air Operated
Welder: Taylor-Winfield 50 KVA HI-Wave

This is but a partial listing. Write for free Catalog. Inquiries invited. HUNDREDS OF OTHERS

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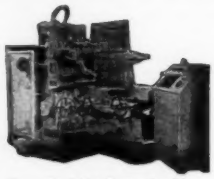


Type BL 2416 Keller Profiler

AUTOMATICS
2" 4 Spindle Cone, 1943
8¾" Conomatic, 5 spindle
1½" Billings & Spencer Dimatic Cutoff

GRINDERS
73 Heald Internal, 1944, like new
14x36" Norton C cylindrical, late
#300 Hanchett surface, 14x60"
Diamond surface, 24x12"
#10 Brown & Sharpe plain cylindrical
12x36" Cincinnati plain cylindrical
Model 145 Hammond carbide tool, wet
P & W deep hole drill grinder, late
#2 Cincinnati Universal and T & C
#48C Carboloy 10" Double End Tool
5 HP Marschke, single end
10x48" Norton cylindrical
72A Heald Internal, late
70A Heald Internal, late
10 x 18 Landis C, plain cylindrical
#5 Giddings & Lewis, hydraulic surface
10G Sellers, single end, horizontal
Rogers #76A, knife-grinder
Oliver single point, tool
Model 1311 Pratt & Whitney, contour

DRILLS
#1½ Avey, 4 spdle., high speed
#2 Detroit Semi-automatic
Kruger 16", six station
Type 14 Natco 12 spindle
#2 LMS Leland-Gifford 4 spindle deep hole
#3 Bausch 24 spdle., #2 M.T.
D6 Colburn, single spindle, #5 M.T.
Model 4230 Bodine Drill & Tapper, 12 sta.
Moline Hole Hog, 2 spindle, older

GEAR MACHINERY
672 B & S cutter
7A Fellows, shaper, high speed, hvy dty
61A Fellows, shaper, high speed precision

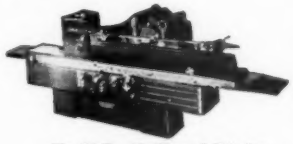
LATHES
24x84" ctrs Boyes & Emmes
Hepburn Shell
28"x7' centers Boye & Emmes
12"x30" centers, Hendey g.c.g.
#12 LeBlond Automatic Production
Model LoSwing 8 x 108" centers, g. h.
Gisholt Simplimatic, platen type
36" x 14' ctr. LeBlond, cone
36" x 14' centers, American, late

MILLS
#5 B & S Vertical, round column
#4 Cincinnati High Power Vertical
1-B Kent Owens hand
Briggs production, hydraulic
2M Cincinnati Universal
#5 B & S Plain Horizontal, cone
35/60 Cincinnati Hydromatic Duplex
24" Cincinnati Duplex
#4 Cincinnati High Power Horizontal
36 x 27" x 6' Newton, planer type

FURNACES
Despatch Model DT 26, draw, gas
Whiting Converter, 2 ton cap., late
Lithdraw heat treat, 1200° F, late
Thermonic Induction, heat treat, late

MISCELLANEOUS
HAMMER: 300# Bradley Upright Helve
PROFILER: Betts, 2 spindle
COMPARATOR: J & L, 30" shadowgraph
BROACH: #4 Lapointe, horizontal
KEYSEATER: #5 Mitts & Merrill
PLANER: Deitrick & Harvey, 48", Dble. housing
LAPPER: 86-36" Gardner, vert. spdle.
WELDERS: Hobart and P & H, Arc, 400 amp.
BULLDOZER: #2 Ajax High Speed, 30 ton
#29U Williams & White

THREADERS
TG 615 J & L grinder, late
#2 Dalzen, 3" O.D., grinder
Model 40 Lees Bradner, miller
LT 6 x 36 Lees Bradner
#33 Excello External, grinder
#39 Excello Internal, grinder



No. 50 Excello Thread Grinder

T. R. WIGGLESWORTH MACHINERY COMPANY
1719 SUPERIOR AVENUE • • • SUPERIOR 1-8727 • • • CLEVELAND 14, OHIO

MUST MOVE PROMPTLY FROM LOCAL CUSTOMER'S PLANT

BEMENT MILES 18" SLOTTER with 3" dia. spindle. M.D.

GOULD & EBERHARD 36" Gear Cutter M.D.

BROWN & SHARPE #5—48" Gear Cutter, M.D.

BINSEE MACHINERY COMPANY HORIZONTAL BORING MILL. Table 30"x64". Quantity of boring bars.

CINCINNATI 60"x48"x14' Planer. 4 heads. 1 extra side head on massive floor stand for open side work. M.D.

B & O #2 Turret Lathe 1" Cap. M.D.

AMERICAN 20"x16' QUICK CHANGE GEAR LATHE. M.D. Old, but good.

BARNES HEAVY DUTY 26", 4-SPINDLE DRILL. 1 spindle for tapping M.D. #4 M.T.

GRINDERS—CYLINDRICAL. B & S #11, 7"x 32". Plain Grinder. Table swivels. Motorized with 4 motors.

LANDIS 10"x36" Plain, M.D. Also Planer type Grinder 16"x36".

"BEMENT" 26" STROKE TRAVERSING HEAD SHAPER. 48" travel to rem. 2 tables.

(PLANER SHAPER)

THE OSBORNE & SEXTON MACHINERY CO.

P. O. Box 88 Columbus 16, Ohio

ALL LATE TYPE

FARNHAM BENDING ROLLS
FOR AIRCRAFT
Model #638 Age 1942 Cap. 6' x 3/8" radius x 1/32" aluminum.
LIKE NEW

Turrets (2)—W & S #2 Chuckers

Turrets (4)—W & S #2 Bar F

Shear—Sq., Famco Power 36"x18 G, New

Shear—Rotary—Quickwork #50A, Circle Cutter & Slitter 48"x¾"

Rolls—Forming, Farnham 6' (aircraft)

Spot Welder—75 KVA

Induction Heater—Lepel 7½ KW

KINGS COUNTY MACHINERY EXCHANGE

408 Atlantic Ave., Brooklyn, N. Y.

TRiangle 5-5237—Dept. "A"

No. 2 Press-Rite Presses, M.D.
Hanna 80-ton Yoke Riveter, 75" reach.
No. 5 Racine 6" x 6" H.S. Hack Saw.
Putnam 18" H.D. Vert. Slotter, M.D.

D. E. DONY MACHINERY CO.

47 Laurelton Rd., Rochester 9, N. Y.

COMBINATION DRILLS & COUNTERSINKS

High Speed

Size	Price Doz. Net	Size	Price Doz. Net
A-1	$ 6.00	J-1	$13.50
C-2	6.00	J-2	13.50
D-1	6.00	M-1	18.00
E-1	6.00	M-2	18.00
E-2	6.00	N-1	24.00
F-1	9.00	N-2	24.00
F-2	9.00		

Semi High Speed

Size	Price Doz. Net	Size	Price Doz. Net
C-2	2.00	F-1	5.00
E-1	2.50	F-2	5.00

VICTOR MACHINERY EXCHANGE, Inc.

251 Centre St. New York 13, N. Y.

Canal 6-5575

SHELL LATHE

Excello model 724 8" shell capacity. Multi tool vertical hydraulic Lathe complete Hydraulic system, motor, etc.

Sacrifice Price for Immediate Sale

LURIA BROTHERS & CO., INC.

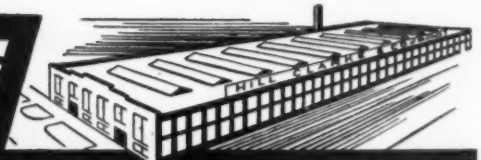
Lincoln-Liberty Bldg., Phila. 7, Pa.

LEAF BRAKE

12'x¼" DREIS & KRUMP. AC MOTOR DRIVE.

WEST PENN MACHINERY COMPANY
1210 House Bldg. Pittsburgh, Pa.

HILL-CLARKE MACHINERY COMPANY



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CUSTOMERS WILL TELL YOU FROM LONG YEARS OF EXPERIENCE with Hill-Clarke machine tools that they are dependable, do their job well, wear well. Meet Hill-Clarke Works Manager, R. B. Colter. Been with the firm 28 years. Supervises Hill-Clake's 58,000 sq. ft. plant equipped with complete and modern facilities for remanufacturing machine tools.

AUTOMATICS

1-1/16" Model A Cleveland (1942)

DRILLS

1 Spdl—26" Sw—No. 2 LMS L.G. Hyd.
2 Spdl—24" Sw—No. 2 Aveymatic
6 Spdl—14" Sw—No. 2 LMS L.G. Hyd.
1-Spdl—#14 Colburn, No. 5 Taper

GEAR MACHINES

No. 12 HS Gould & Eberhardt Hobber
No. 72 Fellows Gear Shaper
11" Gleason Bevel Gear Generator
No. 1 Whiton Auto. Gear Cutter
No. 6 Gleason Bevel Gear Tester (1942)
No. 36-BM G & E 3 Spdl. Rougher

BORING MACHINES

Rockford—3⅛" Bar
72" Nile—Hvy. Pattern

GRINDERS

4"x18" Landis, Model 4H
6"x18" Norton Type C Plain (1943)
6"x30" Norton Type C Plain (1943)
10"x36" Norton Type C (1943)
10"x72" Landis Type C Hydraulic
Hill-Clarke Norton Type Motor Driven Grinders
10"x36" centers
10"x50" centers
10"x72" centers
10"x96" centers
14"x36" centers
14"x72" centers
16"x120" centers
16"-40" gap x 120" centers
18"x96" centers
18"-30" Gap x 96" centers
20"x96" centers
24"-32" Gap x 144" centers
26"x72" Norton Crank Shaft Grinder
15"x15"x8' Norton Surf. Gdr.
No. 25-A Heald Surface Grinder
No. 104 Rivett Internal Gdr. (1943)
No. 72-A-3 Heald Internal Gdr.
No. 72-A-5 Heald Internal (1942)
No. 16-16 Bryant Internal Grd.
No. 16-28 Bryant Internal Grd.
No. 24-26 Bryant Internal Grd.
No. 81 Heald Centerless Internal
No. 74 Heald Internal Centerless

LATHES

36"x18' Putnam Grd. Hd., M.D.
No. 4 Warner & Swasey Tur.-Bar Fd.
No. 6 Warner & Swasey Tur.-Bar Fd.
2¼"x24" Jones & Lamson

MILLING MACHINES

No. 08 Cincinnati Plain
No. 08 Cincinnati Vert.
No. 3 Sundstrand Rigidmil
No. 45-48 Cin. Hyd. Tracer (1941)
6"x36" Lees-Bradner — Model LT (1943)
6"x80" Pratt & Whitney Thrd. Mill
6"x132" Pratt & Whitney Thrd. Mill
6"x168" Pratt & Whitney Thrd. Mill
10"x48" Hanson-Whitney Thread (1942)
10"x60" Pratt & Whitney Thrd. Mill

MISCELLANEOUS

24" Lutter & Geis Shaper
15" Dill Slotter
18" Dill Slotter
38" Morton Draw-Cut Shaper (1945)
18" Newton Slotter
No. 0 Bakewell Tapper
Baush Radial Tapper
No. 307 Barnes Hone
Model 200 Micromatic Horiz. Hone, 1 Spdl.
Model H-2 Micromatic Horiz. Hone, 2 Spdl.
Model 200—H5 Micro.—Horiz.—2 Spdl.
14' Niles-Bement-Pond Roll
Am. Chip Wringers (New) 3.3 to 12.6 bushel capacity
No. 6 R & K Straight-side Press, M.D.
4-B Marvel Hack Saw
48"-14 Ga. Economy Shear
No. 5 Reynolds Power Screw Driver

PLANERS

36"x36"x12' Cincinnati, 2 hds.
36"x36"x12' Gray, 2 Hds.
42"x42"x10' Cincinnati 2 hds.
48"x36"x14' Gray, 2 hds.
48"x48"x12' Cincinnati; 2 hds.

FOR YOUR PROTECTION — THIS 5-WAY GUARANTEE

1. **Hill-Clarke gives unconditional money-back guarantee.**
2. **All machines in stock.**
3. **You can see your machine run and tested under power in our plant before purchasing.**
4. **Complete and modern facilities plus experienced craftsmen for REMANUFACTURING machine tools in our 58,000 sq. ft. plant.**
5. **A responsible organization—83 years' experience.**

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UNUSUAL BUYS WITH GUARANTEED PERFORMANCE

LATHE FEATURES OF THE MONTH

AMERICAN
48"x20' Geared Head, 10" centers, 2⅝" hole thru spindle
30"x32', 12 speed head
30"x12', Geared head
24"x8', geared head
18"x8', geared head
18"x8', 3 SCD bowl head, back geared
18"x6', Geared head
16"x16', Geared Head, 12½" centers, 1¼" hole thru spindle
16"x8', High Duty, 3 SCD
16"x8', 3 SCD, Bowl head type
16"x6', High Duty, Cullman Drive
16"x6' Geared Head, 1¼" hole thru spindle, 12 speed

LODGE & SHIPLEY
27"x18', Patent head
24"x12', Selective geared head
20"x10', 5 SCD
20"x8', geared head
18"x9', Bowl head type, 3 SCD
18"x8', 5 SCD, single back geared
16"x8' Selective Geared Head, 1-9 16" hole thru spindle
18"x6', Selective geared head
14"x6', 3 SCD, double back geared
14"x5', 5 SCD

LeBLOND
30"x14' centers, Geared Head, 16 speed, 20 HP motor
24"x10', 3 SCD, double back geared
21"x8', 3 SCD, double back geared
17"x8', 3 SCD, double back geared
14"x6', 4 SCD, single back geared
#6 Multi Cut, swings 9"

HENDEY
18"x8', 4 SCD
14"x6', Model EBM geared leg
14"x5', 4 SCD, Yoke head type, drive all drive
14"x6', 4 SCD, Yoke head type

MONARCH
16"x8', 3 step conedrive, double back geared, motor drive unit
16"x8', 3 SCD, double back geared
16"x6', Motor on leg type
14"x6', 3 SCD, double geared

BOYE & EMMES
20"x8', 3 SCD, double back geared
18"x8', 3 SCD, double wall apron
Landis 10x24 Type "C" Univ., LATE TYPE
Gardner 24—53" Horiz. Disc Grinder
Micro Model FG Grinder
Bryant #3 Hole Grinder
Heald #78 Centerless Grinder

Three—Cincinnati 6 x 18 Cylindrical Grinders, Model ER, NEW 1943, Complete with infeed and preciprocator attachment.

Style D Planetary Miller
Libby Geared Head Turret Lathe, 24" swing, 4½" hole, 6 position turret, 4 jaw chuck
Oster Turret Lathe
Niles Planer 44x44x14', box table, 2 rail and side heads, power elevation, 24" center to center of Vises
Gray 60x60x14', 2 rail and 2 side heads, power elevation
Gray 32x32x8', 1 rail head, hand elevation, cord housing
Sterling 16", Shaper, motor drive thru gear box, with vise
Gray 42x42x12' 2 rail heads and 2 side heads, power elevation, Planer

BORING MILLS—VERTICAL
King 34", Turret head, self contained, 3 SCD, 12 speed
Colburn 54", Two heads on rail

BORING MILLS—HORIZONTAL
Universal 3½" bar, 16 speed
Cleveland #1, 2½" bar, single pulley drive
Barnes #3, 3" bar

MILLERS—PRODUCTION
Ingersoll 42x36x12', 4 head adjustable rail
Ohio 40" Tilted Rotary Miller

MILLERS—PLAIN
Cincinnati #3, 3 SCD, double back geared, single round overarm
Cincinnati #4 Hi Powered, single pulley drive, single round overarm
Brown & Sharpe #5B, single pulley drive, single round overarm

GUARANTEED MACHINERY

Cincinnati Machinery Co., Inc.
219 East Second Street
Cincinnati 2, Ohio

FINE LATE TYPE GUARANTEED TOOLS

No. 4 GISHOLT Ram Type Universal Turret Lathe, pre-selector head, collet chuck, 1942

No. 5 WARNER & SWASEY Universal Ram Type Turret Lathe, hardened ways, Timken spindle, motor in base, bar feed, chuck, 1936

No. 7A JONES & LAMSON Universal Saddle Type Turret Lathe, preselector head, hardened ways

14"x54" Monarch Model "C" Toolroom Lathe, chucks, collets, taper, new 1941

100" BETTS Vertical Boring Mill, 2 swivel heads, rail adjustable on housings with pegs, DC motor with self-contained motor generator set, new 1942, excellent condition

100" BERTRAM (Niles Patterns) Vertical Boring Mill, 2 heads on rail, rapid traverse

No. 5-48 CINCINNATI Plain Hydromatic Milling Machine, new 1942

No. 18-48 KEARNEY & TRECKER Duplex Production Mill, 1942

No. 2 BROWN & SHARPE Light Type Vertical Mill, new 1942

No. 2D KEARNEY & TRECKER Rotary Head Die Miller, cherring attachment, right angle milling attachment, slotting attachment, rotary table, measuring rods, new 1943

12"x24" **NORTON** "Multi-Purpose" Universal Grinder, internal attachment, 1943

No. 10 BROWN & SHARPE Tool Grinder, 1943

6"x18" **NORTON** Hydraulic Surface Grinder, 1941

8"x24" **ABRASIVE** Hydraulic Surface Grinder, 1943

JONES & LAMSON 14" Pedestal Type Comparator, with attachments, 1942

C225H NATCO Adjustable Spindle Drill, 20 spindles, 1941

No. 4BM FOSDICK Single Spindle Drill, No. 3 Morse taper, 1942

No. 7125A FELLOWS High Speed Gear Shaper, change gears 1943

No. ½ BUFFALO Universal Ironworker, with notcher, MD

No. 5 JOHNSON O.B.I. Press, new 1944, 55 tons

25A HEALD Rotary Surface Grinder, 24" diameter, magnetic chuck

O'CONNELL MACHINERY CO.
1825 NIAGARA ST BUFFALO 7, N.Y.

ANNEALING

Pistons - Propellers - Forgings - Sheet
Aluminum - Magnesium

WE OWN AND OFFER FOR SALE

1 virtually new Electric Furnace Company 72" wide 24" high x 34' long

ROLLER HEARTH ANNEALING FURNACE

25% Radiant Tube gas fired pre heat zone. Remainder 100 KW electrically heated soaking zone. Will anneal in excess of 100 aluminum pistons or 1 ton magnesium sheet per hour at 960°F.

Complete with instruments and recirculating system.

IMMEDIATE DELIVERY SPECIAL PRICE

Full specifications, drawings available

LURIA BROTHERS & COMPANY, INC.

LINCOLN-LIBERTY BLDG. RITTENHOUSE 6-7455 PHILADELPHIA 7, PA.

Hex Steel Bars
190 lbs. ⅜", AMS 5024
1840 lbs. ½", SAE 8740
1266 lbs. 13/16", low alloy, SAE 8735
13509 lbs. 7⅛", lo alloy, SAE 9310
2148 lbs. 1¼", SAE 1137
Round Steel Bars
8000 lbs. ¼", SAE 1020
2300 lbs. .625" plus .000 minus .001, SAE 1045, ground and polished
994 lbs. 1⅛", SAE 1137
265 lbs. 1½", SAE 1137
332 lbs. 2⅜", low alloy, AMS 6440
Nichrome V Ribbon Strip ⅜" Wide
360 lbs. .030" 28 lbs. .026"
107 lbs. .028" 71 lbs. .025"

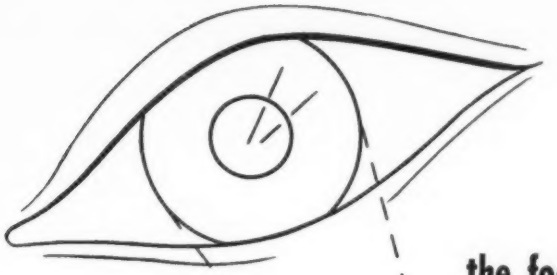
JOHNSON MACHINERY COMPANY
59 Edison Place Newark 2, N. J.

POWER PRESSES

BLISS, TOLEDO, V & O, ETC.
REBUILT — GUARANTEED
MONA
JOSEPH **HYMAN** & SONS
Tioga, Livingston and Almond Streets
Philadelphia, Pa.

Turret Lathe, NEW #4 Morey, with A. C. electrical equipment.
Bement 5½" Horizontal Boring mill with 3-60-220 motor.
Milling Machine, B & S #5B, plain, with A. C., 20 HP Motor, V-Belt Drive.

GUYAN MACHINERY COMPANY
Logan, W. Va.



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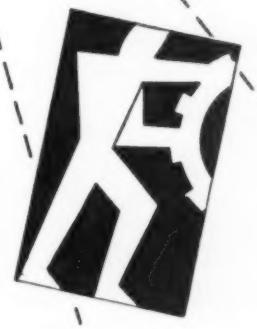
● Yes, wise production men all over America look first to Harvey Goldman for the finest in Machine Tools. Our three generations of Machine Tool experience is your guarantee of complete satisfaction. Consult us about your Machine Tool requirements.



HARVEY GOLDMAN & CO.

3900 SCHAEFER HIGHWAY • DEARBORN, MICHIGAN

Telephone TIffany 6-4450

AUTOMATICS

5/8" No. 204 New Britain 6 spdl.
7/8" Grilley Model G
1" No. 172 New Britain 6 spdl.
1 1/2" Cone 4 spindle
No. 454 New Britain Chucking
14"x19" Fay

BORING MILLS

84" Gisholt
100" Niles-Bement-Pond
2 1/2" Cleveland horiz., long bed
3" Rockford
4" Detrick & Harvey floor type
No. 5D Moline 6 spdl. cylinder bore

DRILLS

14" Leland Gifford, 1, 2 & 4 spdl.
14", 4 spdl Buffalo sensitive
15", No. 2 Avey, 1 & 4 spdl., hydr. feed
16" Sipp, 2 & 3 spindle
24", No. 4B Edlund, power feed
20" & 24" Barnes all geared self oiling
21" & 24" Cincinnati
Nos. 121, 217, 310 & 315 Baker
No. 217H Baker horizontal
Barnes horizontal radial
3' Carlton sensitive radial
3'-10" & 6'-15" Dreses
16 spindle No. 13 Natco multiple
6 spindle No. 17 Foote Burt rail
1 & 4 spdl. Avey No. 2, woodpecker feed
7 spdl. Moline horiz. hydr.
12 spdl. Defiance adjustable rail

GEAR CUTTERS

Nos. 6 & 7125A Fellows shapers
Nos. 8H, 12H, 16HS, 18H G. & E.
No. 130 Cleveland Rigidhobber
No. 5A Lees Bradner hobber
4" Gleason spiral bevel
Gleason testers & lappers
Illinois involute tester
Red Ring shavers, lappers & speeders

GRINDERS, CYLINDRICAL

10"x18" Norton, plain & semi-auto.
10"x18" Landis hydraulic
10"x24" & 16"x72" Landis mechanical
14"x36" Landis hydraulic universal
10"x18", 10"x30" & 10"x50" Norton mech.

GRINDERS, INTERNAL

No. 75A Heald hand feed
Nos. 72A3 & 72A5 Heald
No. 72A3 Heald, cross sliding, head
No. 72A3 Heald Sizematic
Nos. 16-28 16F28 & 24-36 Bryant
Grenby bench type

GRINDERS, SURFACE

Nos. 10 & 16A2 Blanchard rotary
12" & 16", No. 22 Heald rotary
8" Pratt & Whitney rotary (tub)
14"x36" Pratt & Whitney vertical
8"x24", No. 78 Wilmarth & Morman
8"x22", No. 3 Abrasive

MILLERS

No. 2A & 2AS Milwaukee
No. 2 Cincinnati, horiz. & vertical
12" Cincinnati Plain Mfg.
18" & 24" Cincinnati plain automatic
18", 24" & 48" Cincinnati duplex
No. 1-8 & 1-14 Kent Owens hydraulic
No. 1-8 Kent Owens hydraulic
Nos. 1, 2 & 3 Kent Owens hand
No. 1 Kent Owens semi-automatic
20"x84" table Ingersoll vertical
Ingersoll Rise & Fall
6 spindle Moline profiler
24"x18"x14" Ingersoll planer
48"x24"x22" Ingersoll planer
30" Newton rotary
30", 42" & 84" Ingersoll rotary

SHAPERS & PLANERS

24" Queen City Shaper
27" & 34" Morton Shapers
16" Bement Miles slotter
36"x36"x8' Gray planer

MILES MACHINERY CO.
Box 770 SAGINAW, MICH.

LATE MODEL TOOLS

LATHES

12"x30" MONARCH Model CK Toolroom
12"x30" HENDEY 18-Speed Geared Hd. Toolroom
13"x4' bed SOUTH BEND underneath M.D. Precision Lathe
14"x54" L & S Selective Geared Head
14x54 HENDEY 12-speed Engine
16"x7' bed SOUTH BEND Toolroom Precision

AUTO. LATHES & TURRETS

No. 2 B & O Geared Electric Turret Lathe
No. 5DE Potter & Johnston Aut. Turret Lathe
#3 W & S Ram Type Univ. Turret Lathe

MILLING MACHINES

No. 26 VAN NORMAN Ray Type Univ. Miller
No. 2KM KEARNEY & TRECKER Vert. Miller
#12M MOREY 2-spindle Vert. Miller and Profiler, 1942
36"x36"x16' INGERSOLL Adjustable Rail Planer Type Miller, 40 HP AC Motor Drive, One Rail Head, Two Side Heads
No. 08 CINCINNATI Plain & Vert. Auto. Millers

GRINDERS

6"x18" LANDIS Type C Plain Grinder
10"x18" LANDIS Type C Plain Grinder
6"x18" NORTON Vert. Spdle Surface Grinder
Model EG-103 ARTER Pl. Hyd. Cyl. Internal Grinder
10"x72" LANDIS Type C Hyd. Pl. Grinder, 42.
16"x96" LANDIS Type B Plain Cyl. with Gap Bed
No. 16/28 BRYANT Hyd. Internal Grinder
No. 174 HEALD Hyd. Gap Internal Grinder

DRILLS

No. 2LMS LELAND GIFFORD 2-spindle on 4 spindle base
No. 3MS LELAND GIFFORD 2-spindle, hydraulic feed

GEAR EQUIPMENT

No. 725A Fellows High Speed Gear Shaper
No. 36BM GOULD & EBERHARDT Gear Rougher
#12 FELLOWS Gear Shaver

MISCELLANEOUS

#31 LUCAS Horizontal Boring, Drilling and Milling Machine, 3" bar
No. 25-RT G & L Horizontal Boring, Drilling & Milling Machine
16" GEMCO Shaper, M.D.
20" STEPTOE Shaper, Univ. Table
No. 1/2B P & W Two Spindle Reaming Machine, 1944
4 1/2"x36" PRATT & WHITNEY Model C Thread Miller
Model H-1 MICROMATIC Hydrohoner
8" TAYLOR & FENN Spline Millers
7/8" CONOMATIC 4-spindle Auto. Screw Machines
4 3/4" CONOMATIC 4-spdle. Auto. Screw Mach.

WIGGLESWORTH INDUSTRIAL CORP.
203 BENT ST., CAMBRIDGE 41, MASS.-KIRKLAND 7-5242

Botwinik has BUYS! BUYS! $ $ $ $ $ and more BUYS!

LATHES

Niles 48"x30' centers, QCG, Grd Hd, Hvy Dty, AC MD, 2 carriages, taper attch, late type
Niles 60"x26 1/2' Geared Head Engine Lathe, 16' ctrs, MD
LeBlond #2 Gun Boring Lathe (1942), 18 1/4" swing, excellent condition
Schumacher & Boye 30"x12' QCG, DBG, MD, 32 1/4" swing, 66" ctrs, taper attch.

MILLERS

Cincinnati #56-96 Plain Hydromatic (Four), Table 24"x119 3/8", table travel 96", late type
Milwaukee #2204 Duplex Tbl wkg surface 22"x98", range 48"x13 1/4"x12 1/2", motor-in-base, late type.
Reed-Prentice #4 "Improved" Hydraulic Vertical Miller, Tbl wkg surface 70"x24", range 48"x24"x12", late type.
Brown & Sharpe #3A Constant Speed Universal Miller, MD. Dividing heads and attachments, range 34"x12"x19".

GRINDERS

Norton 24"x240" Type "A" Plain Cylindrical, work & roll rests
Norton 10"x96" Plain Cylindrical Grinder, MD
Brown & Sharpe #1 and #2 Universal Grinders, MD, Late type
Brown & Sharpe #20, 10"x18" cap., Electric controls, Late type
Landis 6"x18" Type "C" Hydraulic Cylindrical, 4 motor drive, Late type

SCREW MACHINES

New Britain #60, 1"x5", 6-spindle Automatic, late type, large assortment of tooling, used only 6 months
Norton 10"x36" Hydr. Type "C" late
Landis 6"x20" Plain Hydr. MD
(2) Brown & Sharpe #1 Univ. Grinders, 10"x20" cap., complete—late type—internal spindles—lots of equipment

PRESSES

U. S. 1000 ton 4-posted Hobbing Press, 8" stroke, bed area 19"x19", complete with pump and gauge
DOUBLE ACTION TOGGLE DRAWING PRESSES
Bliss #1, 3 1/2" and 6 1/2" strokes; Bliss #1 1/2", 3" and 8 1/2" strokes; Bliss #3 1/2, 8" and 12" strokes; Bliss #3 1/2A, 12 1/2" and 20" strokes

Send for our free catalog "The Plant That Answers 1001 Machine Tool Problems".

Botwinik Brothers of Mass. Inc
3 SHERMAN ST., WORCESTER, MASS.

1—Bryant #16 Internal Grinder, Serial P-5767.
1—Federal Spot Welder approx. 42" throat depth, type AR36-SA serial 10287 with weldtronic panel control for aluminum, serial DN-102.
1—Drill Press — Cincinnati-Bickford 36" single spindle, upright type, serial #E347.
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1—West Tire Setter, copper bands on 40 MM projectiles, with hydraulic unit, serial #1432.
1—Fisher 500# tilting gas fired aluminum melting furnace, serial #3162.

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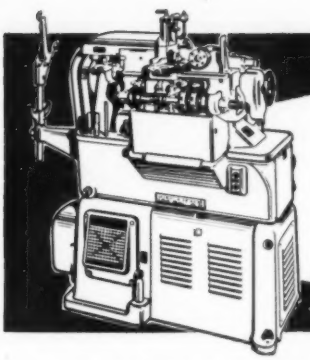

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8—No. 0G H.S. Serial Nos. 10837, 10858, 10859, 10861 (1943); 11383, 11584, 11751 (1944); 12656 (1945); Swing Stop, Vertical Cutoff Slide, ¾" Spindle Cap., 4150 R.P.M. Spindle Speed, Motor in base. Beaver-Bilt.

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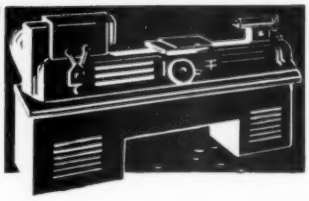

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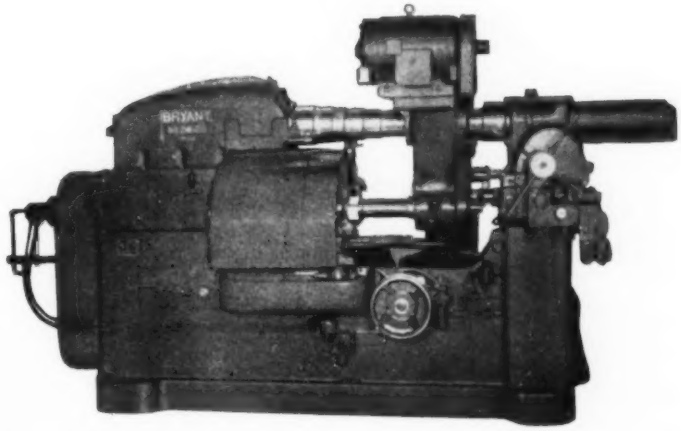

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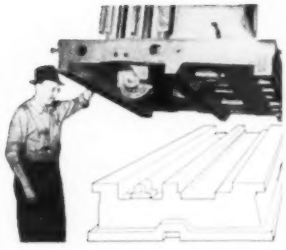
GILBERT

non-metallic ways

WIN *with* NO SCORE



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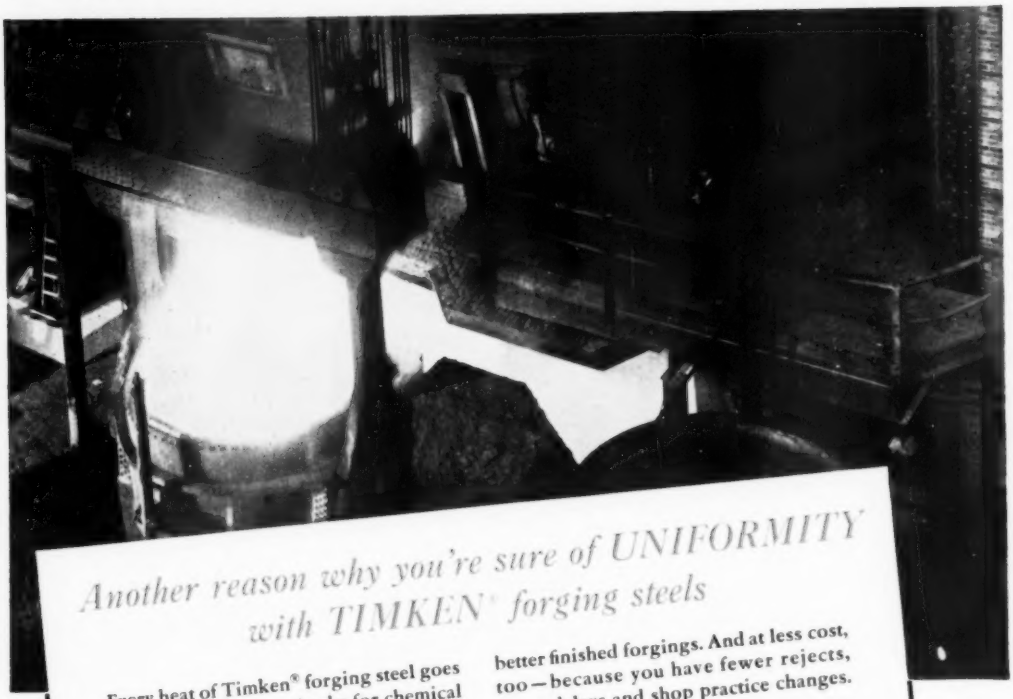

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